# HORTICULTURAL ABSTRACTS

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## EDITORIAL NOTES.

### NEW SERVICES—1. PHOTOCOPIES AND MICROFILMS

It has never been pretended that the abstracts in *H.A.* are in any way substitutes for the original articles. The most they can do is to suggest that here is one paper that would be worth reading in full or that there is another paper that can safely be ignored. Where an original paper is wanted, usually the best and cheapest procedure is to write to the author or publisher and ask for a reprint. With luck you may get one for nothing, and perhaps into the bargain make a useful contact.

There are, however, occasions on which copies cannot be obtained in this way. In the past the Bureau has arranged to have photocopies or microfilms made of articles when asked to do so, but has not been in a position to provide a regular service at fixed prices. Having now obtained some photocopying equipment of our own it is now possible to offer such a service at the following rates:

**Photocopies** despatched by ordinary mail 9d. per page, with a minimum charge of 1s. 6d. per order.

**Photocopies** despatched by air mail 1s. per page, with a minimum charge of 2s. per order.

**Microfilms** can also be provided by ordinary mail at 2d. per page for the first 50 pages and 1½d. per page thereafter, with a minimum charge of 5s. per order. If required by air mail 4s. should be added to the total.

These prices apply regardless of the size of page, the object being to keep correspondence, and hence overhead costs, to a minimum.

They also only apply to articles abstracted in *Horticultural Abstracts* from original papers. That is to say, they do not apply to articles of which we have only copied an abstract from another abstract journal. Nor do they apply to articles abstracted in other C.A.B. journals.

To obtain a photocopy or microfilm all you have to do is to write to us on the following lines:

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Horticultural Abstracts, Volume ........
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I certify that the above photographic copy is required for the purpose of private study, research, criticism or review, and I undertake not to sell or reproduce it."

## NEW SERVICES—2. TRANSLATIONS

In the past the Bureau has occasionally undertaken translations of very short foreign articles or of short extracts from such articles. It has now been decided that we should try to organize a modest translation service. If experience shows that this can be operated without upsetting other Bureau activities and meets a real need, it may be extended at some future date.

Unlike the photocopying service there can at this stage be nothing automatic about the translation service. This is unfortunate, but cannot be avoided if the charges made are not to be exorbitant. In brief, what will happen is as follows:

A reader wanting an English translation of a foreign article abstracted in *Horticultural Abstracts* will write to us giving the author's name, title of the paper (foreign or English), the volume of *H.A.* and the abstract number. We shall then, where necessary, seek permission to publish a translation, and, if this is granted, shall quote a price for it, which will apply both to the original enquirer and to others who subsequently may wish to purchase a copy.

As with the photocopying service, it will not be possible to undertake translations of papers of which only abstracts have been seen in other journals, or of papers that are abstracted in other C.A.B. journals. In addition, we shall reserve the right to refuse a request for a translation.

Translations will, for the most part, be made by a panel of outside translators, who will have to be paid at the usual rates for this work. These rates vary with the language, but they are all high or very high. The prices to be quoted for translations will thus vary with the language and also with the probable demand for copies. As a general guide it is hoped to make most translations available at the following range of prices:

| | *per page* |
|---|---|
| West European languages .. .. .. .. .. .. | 1/6–2/6 |
| Russian and other East European languages .. .. .. | 2/6–4/– |
| Oriental languages .. .. .. .. .. .. .. | 4/6–7/6 |

In undertaking translations the Bureau will co-operate closely with other organizations, such as the D.S.I.R. and the N.I.A.E., which are providing similar services. Where these organizations have already made translations of papers that have been abstracted in *Horticultural Abstracts*, these will be listed with their prices, together with our own translations, in each number of the journal.

## SALIENT ITEMS, Vol. 29, No. 3.

## ENVIRONMENTAL FACTORS

**Light:**—Support is forthcoming for the hypothesis that two photochemical reactions, with an additive effect, control internode expansion in certain plants (2050). A study on broad beans shows that sensitivity to light develops in seeds while they are maturing (2048). As to photoperiodic induction, this does not operate in the absence of $CO_2$ (2047).

**Soil aeration:**—Applying a paraffin coating to the surface of the soil in which carrots are growing can bring top and root growth to a rapid halt (2520).

**Low temperatures:**—In cherry trees cold hardiness may be reduced by nematodes (2262) and in citrus trees by high applications of K fertilizers (2833). Cabbage plants that have been successfully hardened off differ in composition from plants grown at higher temperatures (2443). Anti-desiccant sprays and irrigation water applied at the right time can reduce winter injury to evergreen trees (2805). Cold in moderation may, of course, also be beneficial, as for example, for dormant young strawberry plants and silver maple trees (2209, 2804).

**Warmer temperatures:**—The use of temperature sums to predict the flowering dates of apples may be upset by other factors (2118, 2119). High night temperatures are apt to have detrimental effects on fruit development in both cherries and peas, but these effects vary with the stage of development of the fruit (2124, 2494). Forced lily plants also show different responses to temperature depending on their stage of growth (2761). Certain other bulbs respond to rapid changes in soil temperature by producing contractile roots (2765).

**Water stress:**—In olives this depresses the growth of lateral shoots more than that of the main branches (2901), in citrus it results in fruit with harder rinds (2831) and in tomatoes and tea it affects nucleic acid metabolism (2577, 3055). Other papers throwing light on the responses of plants to water stress are concerned with transpiration, dew absorption and stomatal movements (2040, 2041, 2623).

**Wind protection:**—There are indications that the beneficial effects of windbreaks on bananas are due to reduced leaf damage rather than to reduced transpiration (2926).

## GROWTH AND PHYSIOLOGY

**Planting material:**—With bananas the soil texture of the parent plantation may affect the performance of suckers planted elsewhere (2924).

**Re-plant problems:**—In a nursery after a 5-year rest and in apples as related to phlorizin (2125, 2126).

**Biennial bearing:**—The C : N ratio in olives (2902).

**Pruning:**—With vines severity of pruning appears to have little effect on leaf nutrient contents (2233). With peaches hard pruning may result in lower light intensity within the tree than light pruning (2158).

**Flower sex:**—Affected in cucurbits by growth substances and nutrition (2465, 2466) and in hemp by electric shocks (2677).

**Fruit thinning:**—In spraying to thin grape bunches water alone may be sufficient if applied during flowering (2240).

**Carbon monoxide in plants?** Yes (2052).

**Cytochrome systems:**—Heavy going in tobacco (2624).

**Gibberellins:**—Another review (2093j) is supplemented by the usual spate of papers, which describe the innumerable effects of gibberellins on an endless succession of plants (2058–2060, 2147, 2237, 2478, 2496, 2497, 2633, 2660, 2721, 2729, 2853, 2968, 2969, 3009, 3033, etc.). However, doubtless through an oversight on the part of nature, no gibberellin-like substances are present in the witches' broom fungus of cacao (2942).

**Other growth substances:**—These include quaternary ammonium compounds (2064), tetragonin from New Zealand spinach, which affects the growth of yeasts (2065), and a growth factor in tobacco plants (2636). It is not clear whether penicillin should be classed as a plant growth regulator, but it has been found to increase the growth and alkaloid content of *Datura* plants (2659).

**Tissue cultures:**—The effect of various sugars on the growth of excised tomato roots is described in one paper (2578) and a method of culturing lemon fruit juice vesicles in another (2855). Phloem explants from several species have been found to exhibit growth periodicity when taken at different times of the year (2044).

**Radioactive contamination:**—Of fruits, vegetables and tea in Japan following H-bomb tests (2097, 2435, 3065). As to plant injury from radioactive cobalt, tetraploid forms of some plants may be more resistant than diploid forms (2092v).

## MACHINERY, BUILDINGS AND EQUIPMENT

**Machines and implements:**—To one book (3071) and two general papers on mechanization (2081, 2220) may be added articles, which describe machines for applying fumigants and herbicides (2334, 2416b), harvesters for bulbs, sugar cane and tea (2771, 3044, 3063) and the "perfect" walnut huller (2251). Pneumatic secateurs are available (2084), and tractor-mounted brush cutters can be used to chop up the resultant prunings (2824). Machines, normal and electronic, for grading apples and fresh coffee are also mentioned (2186n, 2977).

**Glasshouses and their equipment:**—Five papers (2085–2089).

**Driers:**—For tobacco, copra and coffee (2648, 2955, 2976).

**Research apparatus:**—A new plant growth chamber is described as inexpensive (2092w). Other items include equipment for recording temperatures in flower buds (2123), for measuring evapotranspiration and dewfall (2092x), for registering changes in the rate of root growth (2117), for injecting chemicals into trees (2873) and for recovering volatile flavours from fruit juices (2092i).

## METHODS, PRACTICAL AND EXPERIMENTAL

**Harvesting and handling crops:**—Five methods of picking citrus fruit are compared in one paper (2883) and methods of bulk handling citrus in three others (2884, 2888, 2917b); studies on the handling and storage of apples in pallet boxes are also described (2174). The use of dual-purpose containers for tomatoes and improved methods of removing the mucilage from coffee beans suggest possible economies (2597, 2975). The influence of the cinema is apparent in an account of a pre-packing competition in France (2176).

**Analytical procedures:**—"Partition chromatography and its use in the plant sciences" is the title of a series of review articles (2078). In papers describing methods of analysing organic compounds in plants tobacco figures prominently (2635, 2639–2641). Analytical procedures are also described for various nutrient elements in plants (2079, 2092b, 2092y, 2949) and for pesticides (2355, 2366o, 2367h, 2917n, 2917s).

**Research techniques:**—In addition to papers appearing under the headings Statistical design (2068–2071) and Experimental techniques (2072–2080), there are accounts of the use of fluorescent tracers to identify individual seeds after they have been planted (2032), of methylene blue to evaluate the rooting of cuttings (2716) and of methods of determining the sizes and distribution of droplets applied by sprinkler irrigation and spraying (2083, 2092j, 2092q, 2093a, 2093i, 2093k).

## NUTRITION

**Diagnosing nutrient needs:**—The choice of time at which to take samples of leaves or other plant organs for analysis is bedevilled by the way in which the proportions of different nutrients vary with the seasons (2139, 2536, 2818, 3056). The choice of plants from which to take the samples may perhaps be slightly simpler (2077, 2230). The choice of the best plant organs to use as samples may depend both on the species and the nutrient to be analysed (2560, 2725, 3030).

**N, P and K:**—Studies involving comparisons between different forms of N appear to be gaining in popularity, and, unfortunately, also in complexity (2564, 2565, 2860, 2915, 3029). In citrus trees P may, under some conditions, depress the growth of feeder roots (2837). In tomatoes the adequacy of the K supply is affected by the Ca/K ratio, but the optimum ratio varies with the soil or sand in which the plants are growing (2567). Both P and K applications affect the concentrations of trace elements in citrus trees (2841) and the transpiration of tobacco plants (2622).

**Other elements:**—More information is available on the role of B in plant growth (2035) and on the absorption of radioactive Co and Sr (2036, 2477). Where, as often happens, Mg-deficient plants do not respond readily to sprays of Mg sulphate, the chloride or nitrate of Mg might be worth a trial (2840, 3094). Mo, which interacts with several other elements (2570), affects plant composition within 2 to 4 hours of application (2424, 2425). Zn deficiency has been corrected in several plants with a variety of chelated and fritted forms (2256, 2257, 2573, 2844, 2845), and one of the latter has also proved useful as a fungicide (2542). Finally, those who still fail to cure their trace element deficiencies may perhaps find some consolation in 2524.

**Toxicity troubles:**—In soils containing bicarbonates ammonium-N fertilizers may be toxic (2820). Where As builds up to toxic levels in orchard soils, the application of Zn and Fe chelates may correct the trouble (2253). Mn toxicity is apt to develop when greenhouse soils are steam sterilized (2572). Salinity problems will, of course, always be with us (2135, 2212, 2574, 2846). Other toxic substances that engage attention from time to time are biuret and fluorine (2038, 2843).

## PLANT PROTECTION

**Fungi and bacteria:**—Disease control programmes can be upset either by failure to control insect pests or by choosing insecticides that favour the development of fungi (2581, 2688). Other complications are suggested by an antibiotic which controls bean rust at one concentration in cloudy weather but needs 10 times the concentration in sunny weather (2485), and by the effect of lime in inhibiting club root disease of brassicas at some concentrations and stimulating it at others (2527). To those interested in the role of natural phenolic compounds in the self-protection mechanism of plants against disease, the effect of mercury phenylbenzocatechin against apple scab may be of interest (2298). Among many other fungicides perhaps the most exotic is garlic powder (2693) and the cheapest plain hot water (2366u).

**Viruses:**—One generally thinks of viruses, even the mild, symptomless strains, as reducing growth and yield (2270), but there are cases in which the reverse occurs (2736). Virus inhibitors include a substance, probably another phenolic compound, found in raspberry leaves (2696) and our old friend milk, though on this occasion processed (2646).

**Insects and mites:**—Just as the insecticides used may upset fungus control, so may the fungicides used upset pest control (2323). So, for that matter, may the manurial programme (2324, 2457, 2732). The development of mite strains resistant to phosphates and fensons continues to cause concern (2322, 2325), but there are indications that oil-phosphate sprays may kill the eggs of mites resistant to phosphates alone (2326). Among new insecticides there are two which have persisted inside cacao trees for as long as 20 months (2945). Among novel ways of dealing with fruit flies is the application to olive fruits of a synthetic resin spray (2907).

**Nematodes:**—There is evidence that nematodes may be vectors of fan-leaf or infectious degeneration of vines (2281–2283). Clonal apple rootstocks are apt to carry more nematodes than seedlings, but these and also vines can be cleaned up by hot-water treatment (2317, 2321).

**Chemicals and their application:**—Aspects dealt with include the spraying or dusting of orchards from the air (2362, 2363), the stability of insecticides in mixtures with fertilizers (2356), the effects of oil sprays on photosynthesis in citrus leaves (2876, 2877) and the placing of Tedion on greenhouse steam pipes to make it act as a fumigant (2795). In addition, there is the interesting observation that deposits from sprays applied to apple trees on the same day may later show up to four-fold differences, depending on variations in the stage of development of the buds (3094).

**Weeds:**—The toxicity of herbicides to crops is apt to vary with the type of soil (2405). Among new aids in the battle against weeds are a very potent new herbicide (2371) and gamma rays (2373), but the more romantic reader may prefer to employ mermaids (2375).

## PROPAGATION

**General:**—Yet another new book, this time covering principles as well as practices (3074).

**Seeds:**—How much simpler life would be if the seeds of deciduous fruits just grew when they were planted (2103, 2109, 2110, 2145, 2146). With beans, seeds of some varieties are more susceptible to mechanical injury than those of other varieties (2470), and seeds that swell slowly when soaked perform better than seeds that swell quickly (2471). Coffee seeds may be germinated successfully in vermiculite enclosed in polythene bags (2959). In studies on the respiration of seeds errors may be caused by the release of a gas on moistening (2033).

**Cuttings:**—Experiments with grafted cuttings confirm that rooting ability is determined by the stem from which the roots originate and not by the kind of leaves on the scion (2799). Juvenile material commonly shows greater rooting ability than mature material but is apt to be in short supply; one paper describes a method of producing large numbers of juvenile hevea cuttings (2994). The effect of auxin in stimulating rooting is influenced by both temperature and light and appears to be associated with increased respiratory activity in the lower parts of the stem (2061). An alternative method of stimulation is to place the basal portions of cuttings in high tension electric fields (2223).

**Marcotting:**—The crop's own residue as its rooting medium (3013).

**Stock-scion relationships:**—Rootstock influence may extend as far as the heat resisting enzymes found in the seeds of certain fruits (2167). In certain walnut combinations symptoms of incompatibility are commonly delayed until the trees are large (2259). In pears different strains of a single variety may show marked differences in compatibility with a single clonal rootstock (2115).

## MISCELLANEOUS

**Extraction of vanillin:**—By ultrasonic treatment (2654).

**Fruit cracking:**—In cherries reduced by fungicides (2267).

**Hairiness:**—And quality linked in tea (3050).

**Labour:**—Manpower and work studies in temperate and tropical horticulture (2024, 2025, 2921).

**Legal problem:**—When the law says crop survey errors should be within $\frac{1}{100}$th of an acre and the surveyors can't get them below $\frac{1}{10}$th (2604).

**Life of cut flowers:**—New chemicals for prolonging (2742).

**Russian horticulture:**—A corner of the curtain lifted (2021, 2217).

## MISCELLANEOUS.

### *General.*

(*See also* 2092z, 3079, 3110.)

2019. U.S. DEPARTMENT OF AGRICULTURE.
**The Agricultural Research Center of the United States Department of Agriculture.**
*Agric. Inf. Bull. U.S. Dep. Agric.* **189,** 1958, pp. 46, illus., 30 cents.

A popular account is given of work at this nerve centre of U.S. agriculture at Beltsville, Maryland. The research deals mainly with broad problems of national interest and much of it is fundamental. The grounds cover 11,000 acres, and the present buildings provide office and laboratory space for some 2,300 workers. The work of each separate division is clearly, but briefly, indicated in this bulletin.

2020. U.S. DEPARTMENT OF AGRICULTURE, FOREIGN AGRICULTURAL SERVICE.
**Agricultural geography of Latin America.**
*Misc. Publ. U.S. Dep. Agric.* **743,** 1958, pp. 96, maps, 65 cents.

A very clear overall view of agricultural production in Central and South America is provided in this work. Copious illustrations in the form of maps show temperatures, rainfall, soils, altitudes, etc., in the different lands, and they are supported by a clear narrative, also in general terms, of production.

2021. MAGNESS, J. R.
**Farming and fruit growing in the U.S.S.R.**
*Proc. 54th annu. Mtg Wash. St. hort. Ass.* 1958, Yakima, pp. 29-32.

Notes of observations made on a 5-week tour in the summer of 1958. Among points made are the following: Generally speaking all farms attempt to produce something of everything irrespective of the suitability of the environment to particular crops. Very heavy farm machinery is in fair supply, but the smaller machines are scarce. Most districts are short of moisture; in most of the Union precipitation averages less than 15 in. a year, and large areas have less than 10 in. *Vegetables.* After potatoes come in importance carrots, beet, cabbages, cucumbers, tomatoes and peas. Other leafy vegetables are little grown. Melons are important in the south. *Fruit.* Only in the extreme south in the Crimea, and in limited areas protected by the Black and Caspian seas, or south of the Caucasus in Georgia and Uzbek, has fruit growing a fair chance of natural success. Despite this, large areas are being planted up elsewhere where severe climatic conditions make survival doubtful. Vinifera vines are grown on a large scale in the south, but even then they have to be covered in winter. In Georgia mandarin oranges are grown in deep trenches covered in winter. This is not considered [even by the locals] to be economic. Again, near Omsk in Siberia, 10,000–12,000 acres are devoted to apple trees, trained by keeping them pegged down to the ground after being planted at an angle of 30° to the soil; grown thus they tolerate extremes of cold even in the absence of snow. All vines are propagated on their own roots since there is no phylloxera [this does not agree with statements in the Russian encyclopaedia translated by Italians, see Abstr. 2217]. For cherries *Prunus mahaleb*, a native of Kuban, is used as a rootstock in the north of Kuban and the wild sweet cherry in the south. Plums are propagated on *P. divaricata*, which grows wild in the mountains, peaches on peach or *P. divaricata*, apricots on apricots. Apples, except those pegged to the ground, are generally headed about 30 in. from the ground to the first branch, and rather bunched, high trees are usual. They are pruned heavily in early years and later only lightly. Organic fungicides are not widely used. All orchards are clean cultivated to preserve moisture. Irrigation is desirable but is little practised from the wells available. Research on fruit is undertaken at many stations, especially in the southern Ukraine, Kuban and other southern areas, and is almost entirely concerned with variety evaluation and breeding, hardiness being the only important criterion.

2022. TUMANOV, I. I.
**The Soviet phytotron.** [Russian.]
*Priroda,* 1959, **48** (1): 112-17, illus.
**The first year's operation of the Soviet phytotron.** [Russian.]
*Izv. Akad. Nauk S.S.S.R., Ser. biol.,* 1959, No. 2, pp. 265-82, bibl. 14, illus.

A phytotron, called "Station of artificial climate", has been in use since 1957 at the Institute of Plant Physiology of the Academy of Sciences, Moscow. It is used to study frost, drought and salt resistance, mineral nutrition, light effects and other physiological problems.

2023. DE LA WARR, EARL, AND OTHERS.
***Report of the Committee on Further Education for Agriculture provided by Local Education Authorities,*** being *Cmnd.* **614,** H.M.S.O., Lond., 1958, pp. 40, 2s. 6d.

Among the recommendations is the following: That horticultural courses should be concentrated at the 4 Horticultural Institutes [at Swanley in Kent, Pershore in Worcestershire, Celyn in Flintshire and Wisbech in the Isle of Ely] and at the Hertfordshire, Lancashire and West Riding of Yorkshire Institutes of Agriculture. The horticultural courses at the other agricultural institutes should be discontinued at an early date.

2024. LOCKIE, G. D.
**Work study as an aid to management in horticulture.**
*Outlook on Agric.*, 1958, **2**: 69-78, bibl. 3, illus.

Method study seeking to improve existing methods and work measurement to determine by standard techniques the proper time for doing work as a guide to better planning and manning are here discussed and illustrated in their application to horticulture at Fernhurst Research Station in the years 1952 to 1957. Method study involves a systematic procedure, the 6 stages of which are defined by the following standard key words: (1) select, (2) record, (3) examine, (4) develop, (5) instal, (6) maintain. Examples of these are cited with reference to such horticultural operations as cauliflower propagation, steam sterilization and harvesting celery, and it is shown how appreciable saving can be achieved as the result of such studies. A consideration of comparative labour costs at Fernhurst, using 1957 as the index year, shows a consistent improvement in the Dutch light, glasshouse and market garden sections as follows: Wages per £1,000 of sales, adjusted for change in basic rate, were in 1952 £444, 1953 £426, 1954 £405, 1955 £375, 1956 £316 and in 1957 £295. From the Fernhurst results and experience the author considers that the use of a full time work study officer would be justified in horticultural concerns, where the pay roll is of the order of £10,000 to £15,000 a year. For smaller units appropriate help should be sought and obtainable from the Agricultural Advisory Services or consultant firms.

2025. GAVETT, E. E.
**Labor used for fruits and tree nuts.**
*Statist. Bull. U.S. Dep. Agric.* **232,** 1958, pp. 52, bibl. 4.

A wealth of tabulated data shows, state by state, the average number of trees per acre and the average man-hours used per acre for direct work, such as planting, spraying, cultural activities, harvesting, farm grading, packing and marketing. Indirect labour and overheads are not included. Summarized, these figures show that in 1954 the average man-hours used per bearing acre were for non-citrus fruits 134, for citrus fruits 117 and for tree nuts 40. The average man-hours for individual non-citrus fruits were: pineapples and pomegranates 306, dates 285, cranberries 264, sweet cherries 256, nectarines 241, apricots 226, persimmons 205, pears 164, peaches 158, olives 157, sour cherries 156, plums 128, apples and prunes 122, figs 112, grapes 106 and avocado pears 87. Among citrus fruits lemons topped the list with 263 man-hours, followed by limes 192, navel oranges 132, grapefruit 105, and Valencia and other oranges 98 to 100. For tree nuts the figures were: almonds 71, filberts 64, walnuts 50, improved pecans 38 and wild pecans 17.

2026. STARNES, O.
**Marketing research and education in New Jersey.**
*N.J. Agric.*, 1958, **40** (6): 3-16, illus.

This issue deals with the work of the Agricultural Experiment Station at Rutgers University on marketing problems. In the review of the current programme mention is made of the use of antibiotics to control decay in lettuce and rot in strawberries and peaches; the keeping qualities of blueberry varieties; prepackaging of broccoli; new chemicals for hydrocooling peaches and strawberries; the synthesis of fruit pectins; comparisons between the "high temperature-short time" process, canning, and freezing methods of preserving tomato juice, green beans and vegetable soups. The Agricultural Economics Section is mainly concerned with the development of prepackaging on the farm of such crops as asparagus, apples and lettuce. H.L.

## *Nectar and pollen plants.*

(*See also* 2186f, 2796.)

2027. WILSON, W. T., MOFFETT, J. O., AND HARRINGTON, H. D.
**Nectar and pollen plants of Colorado.**
*Bull. Colo. St. Univ. Exp. Stat.* **503-S**, 1958, pp. 72, illus.

Observations made on some 114 different named plants, some cultivated, some wild, are here recorded and reveal the percentage sugar in the nectar, number of bees concerned, size of honey sacks and colour of liquid, date and location. Among general observations made are the facts that the attractiveness of the flowers of some plants varies greatly from place to place, that bees visit many different plants even during a good honey flow, that the nectar from ash (*Fraxinus* sp.) had the highest average sugar concentration, 62·6%, while that of wild iris had the lowest, 16·3%, and that the sugar concentration of the nectar varies considerably between species of the same genus, e.g. in *Trifolium*, and between varieties within species, e.g. *Melitotus alba*. Ornamentals which gave promise as honey plants included oleaster (*Elaeagnus angustifolia*), anise-hyssop (*Agastache foeniculum*), hollyhocks, snowberry (*Symphoricarpus occidentalis*) and cut-leaf chastetree (*Vitex negundo incisa*).

2028. CLARK, K. K.
**Honeybees in the orchard.**
*Agriculture, Lond.*, 1959, **65**: 572-5, bibl. 1.

In the author's view the essential to success in the use of bees as pollinators is to ensure the presence of enough trees providing suitable pollen. In an interesting table he shows the spread of flowering period of fruit trees and rival plants in a typical season in England, the rivals being blackthorn, wild cherry, dandelion, charlock, other brassicas, maple, sycamore and holly, and discusses the attraction these have for bees at various temperatures. [See also *H.A.*, 24: 3491.]

### *Seeds.*

(*See also* 2103, 2109, 2110, 2144-2146, 2222, 2535, 2609-2611, 2691.)

2029. Koopman, M. J. F.
Feuchtigkeitsbedingungen für die Lagerung von Samen. (**Moisture conditions for the storage of seeds.**)
*Saatgut-Wirtsch.*, 1959, **11**: 6-11.

The State Seed Testing Station, Wageningen, recommends that seeds should be dried at 50% R.H. and 25–30° C., being spread in thin layers under a current of air having a speed of 0·15–0·35 m./sec. As the seeds become fairly dry the temperature may be raised. Storage should be in a dry place. In practice, seeds were stored in an attic at 60–70% R.H. for 1–1½ years. Tables are presented showing the moisture contents and germination percentages for seeds of 47 crop species stored for various periods in linen and polythene bags. Recommended maximum moisture contents are given for seeds of numerous fruit, flower and vegetable species.

2030. Bate-Smith, E. C., and Ribéreau-Gayon, P.
**Leuco-anthocyanins in seeds.**
*Qual. Plant. Maveg.*, 1959, **5**: 189-98, bibl. 21.

Seeds and leaves of a wide range of plants were tested for leuco-anthocyanin, leuco-delphinidin and leuco-cyanidin. Where such substances occurred in the leaves of a species, they were almost invariably present in the seeds as well, but in a number of plants they occurred in the seeds and not in the leaves. The commonest site was the seed coat, and, as their presence is hereditary, it follows that any undesirable effects in food technology could eventually be eliminated by breeding. [See also *H.A.*, 28: 1026.]

2031. Spreafico, L.
Osservazioni sui metodi indiretti per determinare la vitalità dei semi. (**Indirect methods of determining seed vitality.**)
*Sementi elette*, 1959, **5**: 36-43, bibl. 11.

The author briefly discusses the merits of different methods. These are based on exterior and interior appearance of seed coat, transparency, specific gravity, embryo size in relation to seed size, embryo germination, X-ray treatment and reactions to different chemicals. The method preferred by him is that advocated by Lakon who uses a solution of tetrazolium chloride to colour the live tissues of the embryo. From the identification of what parts are living a shrewd estimate can be made of the vitality of the seed.

2032. Maughan, G. L., and Dunn, J. S.
**The use of fluorescent tracers for identifying individual seeds.**
*J. agric. Engng Res.*, 1959, **4**: 181-5, bibl. 1, illus.

A technique is described by which seeds are marked with fluorescent materials so that they can be recovered and identified in soil samples under an ultra-violet light.

2033. Haber, A. H., and Brassington, N.
**Non-respiratory gas released from seeds during moistening.**
*Nature*, 1959, **183**: 619-20, bibl. 6.

Seeds of various species were shown to produce a gas when moistened, the production, in the lettuce seeds tested, being greater at higher temperatures. This phenomenon was also observed in killed seeds, which neither germinated nor respired, and in other dry plant material. It is suggested that this phenomenon may lead to errors of over-estimation in respiratory studies on seeds.

### *Mineral nutrition.*

(*See also* 2092s, 3081.)

2034. Goss, J. A., and Romney, E. M.
**Effects of bicarbonate and some other anions on the shoot content of $P^{32}$, $Ca^{45}$, $Fe^{59}$, $Rb^{86}$, $Sr^{90}$, $Ru^{106}$, $Cs^{137}$, and $Ce^{144}$ in bean and barley plants.**
*Plant and Soil*, 1959, **10**: 233-41, bibl. 28.

The addition of sodium bicarbonate to nutrient solutions treated with radioactive substances very significantly reduced the shoot content of all except $Cs^{137}$. The amounts of $P^{32}$ and $Ca^{45}$ in bean shoots were reduced by both sodium nitrate and sodium sulphate, and the latter salt also checked the uptake of $Sr^{90}$.—Univ. Calif., Los Angeles.

2035. Whittington, W. J.
**The rôle of boron in plant growth. II. The effect on growth of the radicle.**
*J. exp. Bot.*, 1959, **10**: 93-103, bibl. 20.

Estimates of cell number, cell volume, respiratory rate, nitrogen, sugar, and nucleic acid content were made on 1 mm. sections of the radicles of field bean at frequent intervals during the first 96 hours of growth in nutrient solutions with and without boron. The primary effects of deficiency were cessation of cell division and enlargement of the apical cells. The increased volume of the apical cells may have been due to either a longer period being available for development as the rate of mitosis decreased, or to an unusually rapid rate of cell extension. The results indicated that cell division did not cease for lack of available sugar nor as a result of failure to synthesize protein or nucleic acids. It is suggested that in the absence of boron division ceases because abnormalities in the formation of the cell wall prevent the cell from becoming organized for mitosis. In particular the hypothesis that boron is concerned with the formation of "pectin" from uridinediphosphate-D-glucose is examined in the light of published evidence. [Author's summary.]—Univ. Nottingham. [For Part I, see *H.A.*, 28: 49.]

2036. GULJAKIN, I. V., AND JUDINCEVA, E. V.
**The uptake of $Co^{60}$ by plants and its accumulation in the crop.** [Russian.]
*Doklady Akad. Nauk S.S.S.R.*, 1958, **123**: 368-70, bibl. 4.

$Co^{60}$ was applied at low, non-toxic rates through the roots of wheat and pea plants grown in both water and sand cultures. Only a relatively small amount of the absorbed isotope was translocated into the aerial parts of the plants, 80–98% of the total content being found in the roots. $Co^{60}$ was absorbed during the whole growing period—rapidly at first, less readily toward the end—and reached a maximum content at ripening. Peas took up more than wheat, especially in sand culture, the $Co^{60}$ content in the seeds of peas grown in sand being about 8 times that of wheat.

2037. WILDON, C. E.
**The effect of prolonged leaching and of successive generations of plants on the solubility of iron and manganese in glassy frit.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 443-9, bibl. 18, illus.

Glass frits were used for 745 days in the soilless culture of several crops, including roses, gardenias, tomatoes and asters. Iron solubility declined considerably, but Mn solubility declined only slightly during the experimental period. With decreasing pH, Fe tended to become less soluble, and Mn much less soluble. Manganese was exhausted more rapidly from the frits than Fe.—Mich. St. Univ., E. Lansing.

2038. PLAISTED, P. H.
**The effect of 2,4-dithiobiuret on some of the biochemical components of cotton and coleus plants.**
*Contr. Boyce Thompson Inst.*, 1959, **20**: 83-101, bibl. 39.

Application of dithiobiuret to the soil around the plants promoted leaf abscission with no apparent morphological changes. Leaves of treated plants, however, contained more protein and more free amino acid than those of untreated plants. Treatment also caused an increased respiration rate. P uptake was accelerated shortly after treatment and then declined until treated leaves contained less P than untreated. Studies with $C^{14}O_2$ indicated that dithiobiuret treatment also accelerated carbohydrate turnover. The metabolic implications are discussed.

2039. POULSEN, E.
Kan den kemiske planteanalyse anvendes som indikator for planternes ernaeringstilstand? (**Can chemical plant analysis be used as an indicator of the nutritional status of the plant?**)
*Horticultura*, 1959, **13**: 4-7, 21-6, bibl. 7 and 5 respectively.

Tables and graphs suggest that the results of plant analysis are affected by a variety of factors. Until these factors are better known, it is argued, plant analytical data cannot be safely interpreted in terms of nutritional status, although they constitute a valuable supplement to the findings of soil analysis.—Blangstedgaard.

### *Physiology and metabolism.*

(*See also* 2092a, d-g, p, v, 2093c, d, m, 2574, 2749, 3076, 3084, 3113.)

2040. DE WIT, C. T.
**Transpiration and crop yields.**
*Versl. Landbouwk. Onderz.* **64.6**, 1958, pp. 88, bibl. 82.

The author discusses theoretical and practical aspects of the transpiration of crops in the field, and he concludes that the relationship between transpiration and total dry matter production is much less affected by growing conditions than has been supposed. In semi-arid and arid regions, this relationship depends on plant species and on free water evaporation, while in cloudy regions it depends mainly on plant species. This difference is due to light intensity; in cloudy regions assimilation is less than in regions with more bright sunshine. The relationship between transpiration and dry matter in plants grown in the field with limited available water is often similar to that for container-grown plants. Where water is not limited, however, transpiration tends to increase, although even when transpiration becomes considerably greater than free water evaporation, the relationship between transpiration and production in the field resembles that of plants growing in containers. The relationship between transpiration and total dry matter production is not affected by the ability of plants to withstand periods of drought, but the amount of marketable product and total amount of water which is transpired during the growing period may depend largely on their drought resistance.—Inst. biol. scheik. Onderz. Landbouwgew., Wageningen.

2041. WAISEL, Y.
**Dew absorption by plants of arid zones.**
*Bull. Res. Coun. Israel, Sect. D*, 1958, **6D**: 180-6, bibl. 14, illus.

Eighteen species of desert plants and of Mediterranean evergreen trees and shrubs, including carobs, olives and *Pistachio lentiscus*, were examined for dew absorption by their aerial organs in 4 investigations carried out at Beersheba and Jerusalem in 1954–55. For this purpose the "V" method was devised, in which V-shaped branches, more or less equally foliated, were selected, one arm being protected during the night with a polythene bag, and leaves from both arms being sampled at sunset and sunrise. It was found that these plants could be sharply divided into absorbers and non-absorbers, with no distinction between Mediterranean and desert plants. There was a negative correlation between soil humidity and dew absorption, but the amounts of dew taken up were completely inadequate to balance the daily transpiration loss.—Hebrew Univ., Jerusalem. H.L.

2042. SUBBOTINA, N. V.
**The effect of wilting on redox conditions in plants.** [Russian, with English summary ½ p.]
*Fiziol. Rast.*, 1959, **6**: 42-7, bibl. 12.

In wilting leaves of cucumber, bean, poppy, and certain ornamental and other plants the oxidizing potential increased and the reducing potential decreased. This is contrary to previously published views.

2043. BERTOSSI, F., AND CIFERRI, R.
Sulle supposte azioni biologiche dell'acqua "fervorizzata" e da disgelo. (**The supposed biological action of water which has been autoclaved and of that from melting ice.**) [English summary 10 lines.]
*Atti Ist. bot. Univ. Pavia*, 1958, **15**: 1-9, bibl. 9.

Neither water from melting ice nor that autoclaved at 135–137° C. behaved differently from ordinary water in their effects on the growth of various plants, including broad beans. The effects previously described by certain authors may have been due to changes in the content of salts and dissolved gases.

2044. SUSSEX, I. M., AND CLUTTER, M. E.
**Seasonal growth periodicity of tissue explants from woody perennial plants *in vitro*.**
*Science*, 1959, **129**: 836-7, bibl. 5.

Secondary phloem explants from several species proliferated most extensively when cultured in the spring. Successive batches of explants taken subsequently proliferated less until some months before bud-break when growth increased again in spite of the dormancy of the terminal buds.

2045. SINJUHIN, A. M.
**Physiological characteristics of the initiation of secondary meristem tissues.** [Russian, with English summary 6 lines.]
*Fiziol. Rast.*, 1958, **5**: 481-7, bibl. 28, illus.

Experiments with tomato plants confirmed data in the literature that callus formation requires a high rate of gas exchange, and that differentiation of growing points needs adequate oxygen. When the rate of gas exchange is reduced, differentiation ceases and tumorous leaf- and scale-like organs result. [An earlier account of this work was noted in *H.A.*, 28: 1546i.]

2046. DOMAN, N. G.
**The interrelationship between photosynthesis and respiration in plants.** [Russian, with English summary 6 lines.]
*Biohimija*, 1959, **24**: 19-24, bibl. 14, illus.

Determinations were made of the changes in certain products formed in bean and tobacco leaves exposed to $C^{14}O_2$ in light and darkness and participating in both photosynthesis and respiration. It was found that the photosynthetic intermediates formed under natural conditions can be directly used to supply the main requirements of respiration in light.

2047. ODUMANOVA, G. A.
**The relationship between photosynthesis and photoperiodism in plants.** [Russian.]
*Doklady Akad. Nauk S.S.S.R.*, 1959, **124**: 711-14, bibl. 6, illus.

In experiments with perilla (*Perilla ocymoides*) and Abyssinian cabbage (*Brassica crenata*) the removal of $CO_2$ from the atmosphere of the leaf during photoperiodic induction resulted in purely vegetative growth without the subsequent development of flower primordia.

2048. LANE, G. R., AND BUTLER, R. D.
**Effect of light on maturing broad bean seeds.**
*Nature*, 1959, **183**: 1063-4, bibl. 2.

Plants were raised in natural light conditions and some of the pods enclosed in light-tight bags when approx. 1 in. long. When mature the seeds from these pods were removed and dried in darkness; seeds from uncovered pods were dried in the light. All seeds were then germinated and grown in darkness. After 13 days the first internodes from seeds matured in darkness were 16% longer than those matured in the light. Sensitivity to light is thus shown to develop during seed maturation and to survive a short drying period. [For earlier work, see *H.A.*, 28: 2584.]—Univ. Southampton.

2049. VOSKRESENSKAJA, N. P., AND GRIŠINA, G. S.
**The effect of intensity and spectral composition of light on metabolism and yield.** [Russian.]
*Doklady Akad. Nauk S.S.S.R.*, 1959, **124**: 469-72, bibl. 11.

Bean plants, variety Triumph, were grown in soil culture under light of 3 different intensities and 2 colours, red (peak 620–680 mμ) and blue (peak 460–540 mμ). Both the fresh and dry weights of 18-day-old seedlings were increased by high light intensity and blue colour. Flower bud formation was not affected, but the onset of flowering was hastened by high light intensity, and flowering was most profuse and the seed yield highest under blue light. The total and protein N in the leaves were increased by blue light, the increment being markedly lower at higher intensities. In the seeds the protein N was reduced under blue light. Cytochromoxidase activity in the leaves was greater and much less affected by intensity under blue than under red light. [See also *H.A.*, 28: 3242.]

2050. Sale, P. J. M., and Vince, D.

**Effects of wave-length and time of irradiation on internode length in *Pisum sativum* and *Tropaeolum majus*.**

*Nature*, 1959, **183**: 1174-5, bibl. 6.

A preliminary treatment of pea and nasturtium plants with infra-red light did not affect their response to blue or red radiation, but even with rather long preliminary exposures to red radiation the effect was almost completely reversed by exposure to infra-red. The effect of blue radiation, however, was only slightly reduced by subsequent irradiation in the near infra-red. The results support the hypothesis that there are at least 2 photochemical reactions with an additive effect controlling internode expansion in these species, viz. a preliminary low-intensity reaction (red/infra-red reversible) and a subsequent reaction which is more sensitive to blue radiation and is not reversible by infra-red. This second reaction is more important for *Tropaeolum* than for *Pisum*, in which internode elongation was more effectively suppressed by red than by blue light. The treatment blue-red was more effective than red-blue in reducing internode length, although quantitatively both treatments were the same. The significance of this response is discussed.—Univ. Reading, Shinfield.

2051. Pratt, C.

**Radiation damage in shoot apices of Concord grape.**

*Amer. J. Bot.*, 1959, **46**: 103-9, bibl. 13, illus.

Dormant rooted cuttings of "Concord" grape were exposed either to 200–6,000 r of X-rays or to 2–6 hrs of thermal neutrons (average total dose of $4{\cdot}80 \times 10^{11}$ to $1{\cdot}59 \times 10^{13}$ neutrons/cm.$^2$). Percentage of plants surviving in the field tended to decrease with dosage beginning with 2,000 r of X-rays or 2 hrs of thermal neutrons. It showed a sharp drop in lots which had received doses of 4,000 r of X-rays or 4 hrs of thermal neutrons. Frequency of budless shoots (shoots lacking a terminal bud after the first leaves emerged) increased with dosage, beginning with groups which had received 2,000 r of X-rays or 2 hrs of thermal neutrons. Microscopic examination of radiation-damaged shoot apices showed one or more of the following characteristics: (1) shape and organization of the apical meristem different from that of the untreated shoot apex, which is described; (2) no young primordia; (3) acropetal advance of maturation of cells; in 4 cases cells with spirally thickened, lignified walls were found 1–4 cells deep in the meristem; (4) collapse of cells in the tunica and corpus; formation of periderm and deeper, cambium-like divisions below the wound; (5) site of the former apical meristem either carried up on the base of a single terminal leaf or remaining a flat area between terminal leaves. Aspects of radiation sensitivity of the shoot and theories of shoot organization with references to natural and induced chimeras are discussed. [Author's abstract.]—N.Y. St. agric. Exp. Stat., Geneva, N.Y.

2052. Wilks, S. S.

**Carbon monoxide in green plants.**

*Science*, 1959, **129**: 964-6, bibl. 8.

The carbon monoxide content of various portions of fresh green vegetation was determined. Green plants grown in a closed illuminated system liberated small quantities of CO and, similarly, powdered, oven-dried leaves, when illuminated and provided with oxygen and moisture, yielded CO and certain aldehydes. The 480–680 mμ component was found to be the effective portion of the spectrum.

2053. Shannon, L. M., Young, R. H., and Dudley, C.

**Malonate metabolism by plant tissues.**

*Nature*, 1959, **183**: 683-4, bibl. 11.

The excised leaves of 45 species of plants were allowed to absorb labelled malonate for 17 hrs, and were then dried and the organic acids extracted and tested for radioactivity. The plants incorporated the No. 2 carbon of malonate into one or more of the identified acids—malate, citrate, succinate or fumarate. It is, therefore, suggested that the enzyme(s) capable of metabolizing malonate may be widespread throughout the plant kingdom. Figures are given for 15 species.

2054. Medvedev, Ž. A.

**The use of peptides in the biosynthesis of proteins.** [Russian, with English summary ¼ p.]

*Biohimija*, 1959, **24**: 94-100, bibl. 22.

The utilization of complete (amino acid) and incomplete (peptide) hydrolysates of $C^{14}$-labelled proteins for protein synthesis was studied in bean leaves. In all experiments the incorporation of peptides into proteins was more rapid than that of complete hydrolysates, but they were oxidized and decarboxylated more slowly.

### *Growth substances.*

(*See also* 2092a, d, f, g, 2093e, j, 2110, 2146-2148, 2197, 2213, 2225, 2237, 2252q, 2372, 2480, 2579, 2582, 2636, 2721, 2723, 2728, 2729, 2743, 2766, 2791, 2835, 2934, 2968, 2969, 3033-3035.)

2055. Krewson, C. F., and others.

**Synthesis and preliminary evaluations of amide, lactic acid, and terpenoid derivatives of substituted phenoxycarboxylic acids.**

*J. agric. Food Chem.*, 1959, **7**: 118-22, bibl. 14.

Thirty-two new compounds were prepared and tested on various plants, including beans and cucumbers. All induced growth responses, but, in general, these were less than those induced by the parent regulating compounds.—U.S.D.A., Philadelphia 18, Pa, and Beltsville, Md.

2056. Osborne, D. J.
**Control of leaf senescence by auxins.**
*Nature*, 1959, **183**: 1459-60, bibl. 10.

2,4-D and 2,4,5-T were applied in drops of ethanol to the leaves of a number of temperate deciduous species including *Prunus serrulata senriko*. Normal senescence was prevented. Investigations showed that the colour of the small areas of green tissue where the drops were applied was not due to the immobilization of chlorophyll in an inactive form; these areas also retained a relatively high oxygen uptake. The level of alcohol-insoluble N also remained higher in the green, treated areas. The results showed that the auxins tended to maintain unchanged particular physiological states within the cells and so delay the normal senescence changes.

2057. West, S. H.
**Physiological and biochemical effects of 2,4-dichlorophenoxyacetic acid on cellular metabolism in plants.**
*Diss. Abstr.*, 1958, **19**: 929, being *L.C. Card No. Mic.* 58-5519 of 92 pp.

In laboratory studies the effects of potassium chloride and 2,4-D were synergistic in promoting growth, and additive in increasing respiration and in accelerating the degradation of ribonucleic acid in cucumber tissue. It is suggested that the promotion and inhibition of cucumber growth resulting from 2,4-D applications may be related to RNA metabolism.—Univ. Ill.

2058. Corte, A., and Ciferri, R.
Prove di efficacia delle gibberelline su cento specie coltivate. (**Tests on the effectiveness of gibberellins on a hundred species of cultivated plants.**) [English summary 9 lines.]
*Atti. Ist. bot. Univ. Pavia*, 1958, **15**: 175-214, bibl. 5, illus.

Preliminary tests, usually with 3 applications, were made with commercial gibberellins on a wide range of plants. Positive responses (mainly in growth) were shown by 55 of the 100 species tested, and, in general, only the first application was important. Increases or decreases in growth rate are tabulated for each treatment of 39 of the 100 species, and general observations are given for a further 18 species. The 45 species which did not respond are also listed. The species are grouped into those with more than 100% growth increase over controls at any period, those with consistently positive increments, those with negative increments following the positive but with a positive final result, those in which the initial stimulation was finally approximately cancelled out by subsequent retardation, and the one (*Forsythia viridissima*) in which the retardation was markedly greater than the initial acceleration. The most striking growth response was that of a 1,166% net increase in *Opuntia imbricata*. Among the species responding by advancement of flowering were *Xanthium strumarium*, chicory, *Dahlia variabilis*, *Onopordon acanthium*, zinnia, basil (*Ocimum basilicum*), *Salvia splendens*, runner bean, *Verbascum phlomoides*, *Datura stramonium*, *Capsicum annuum* and celery. Dormant buds became active in *Diervilla hybrida*, *Aucuba japonica*, *Sansevieria zeylanica* and cherry. Fruit set was improved in *Capsicum annuum*, and leaf development in *Furcraea gigantea*, beet, chicory, cabbage, *S. zeylanica*, *Yucca* sp., *Primula obconica*, cherry, plum, coffee, *Opuntia imbricata*, *D. hybrida*, *A. japonica*, chestnut, hydrangea, *Ailanthus glandulosa*, *C. annuum*, tomato, celery and carrot. Root development was improved in beet, and bulb production in onion. Excessively long, weak shoots were induced in 14 species, and fruit deformities occurred in tomato.

2059. Dancer, J.
**Synergistic effect of zinc and gibberellin.**
*Nature*, 1959, **183**: 901-2.

The effect of gibberellin in elongating the second internode of dwarf beans was enhanced by the addition of zinc sulphate. Sulphates of Fe, Mg and K had no such effect, and copper sulphate reduced growth.—Univ. Nottingham.

2060. Galston, A. W., and Warburg, H.
**An analysis of auxin-gibberellin interaction in pea stem tissue.**
*Plant Physiol.*, 1959, **34**: 16-22, bibl. 18.

When GA and IAA are applied jointly to excised 5 mm.-long epicotyl sections of etiolated peas, the growth effects produced are no greater than additive, and are frequently less than additive. If, however, GA is applied basally to an excised 100 mm.-long epicotyl, and the IAA subsequently applied to the excised apical section, the combined growth effects are much more than additive (synergistic). The epicotyls react to as little as $10^{-7}$M GA, half maximally to $10^{-6}$M GA and optimally to $10^{-5}$ and $10^{-4}$M GA. They can thus be used to assay GA in this range. The volume of solution to be assayed per epicotyl need not exceed 0·08 ml., and can thus be used to detect down to 0·03 µg. of GA. Appreciable effects of basally-applied GA are evident at the apex, 100 mm. away, within 3 to 5 minutes after application, indicating a transport rate as rapid as 20 to 33 mm./min. The effects of GA in such an etiolated epicotyl is directly proportional to the length of epicotyl between the base, which received the GA, and the apex, which received the IAA. In green stems, where GA-IAA synergism is clearly shown in excised 5-mm. sections, GA effects are dependent on the length of stem traversed, even if no auxin is supplied to the excised section. These results can be interpreted in terms of a "third factor" required for GA-IAA interaction. Such a factor, apparently limiting in etiolated pea stem tissue and abundant in green tissue, may operate through an auxin-sparing mechanism. [Authors' summary.]—Yale Univ., New Haven, Conn.

2061. VERZILOV, V. F., AND RUNKOVA, L. V.
**The effect of environment on the intensity of respiration in cuttings treated with growth substances.** [Russian.]
*Doklady Akad. Nauk S.S.S.R.*, 1959, **124**: 466-8, bibl. 5.

Bean cuttings were kept for 6 hrs in a 0·01% solution of the potassium salt of heteroauxin and were then rooted at combinations of 2 temperatures (12–14° C. and 18–20° C.), and 2 light intensities (5,000 and 20,000 lux). Respiration was measured in the lower and upper parts of stems and leaves on 7 occasions, up to 12 days after treatment. The results show that respiratory activity was increased by the growth substance, and was highest at the higher temperature and light intensity, conditions under which the greatest stimulation of root formation by heteroauxin occurred.

2062. MUNAKATA, K., AND NAKAI, A.
**Absorption and translocation of 2-I$^{131}$-2,3,5-triiodobenzoic acid.**
*J. agric. Food Chem.*, 1959, **7**: 176-8, bibl. 7, illus.

Labelled TIBA was supplied to tomato and barley plants by foliar application and through the roots. Both plants absorbed and translocated TIBA with ease *via* the roots, but there were differences between them in the case of foliar application. There was almost equal absorptive ability, but TIBA was not translocated to the shoot apex of barley following foliar application. In the tomato translocation was first downwards, but later retranslocation occurred upwards. It is suggested that TIBA is not antagonistic to native auxins but inhibits growth in some other manner.—Nagoya Univ., Anjo-City, and Shiga agric. Exp. Stat., Kusatsu-City, Japan.

2063. DAS, N.
**Studies on the effect of time factor on the stimulation of root growth by certain anti-auxins.**
*Indian J. Plant Physiol.*, 1958, **1**: 44-53, bibl. 19.

Excised pea root sections were treated with 5 anti-auxins. The extension-time curves of all 5 were generally similar, but wide variations of growth rate with time were observed. One compound (α-1-naphthyl-methyl-sulphide propionic acid), in contrast to the others, showed delayed action with maximum stimulation 10–24 hours after excision.

2064. KREWSON, C. F., AND OTHERS.
**Synthesis and biological activity of some quaternary ammonium and related compounds that suppress plant growth.**
*J. agric. Food Chem.*, 1959, **7**: 264-8, bibl. 14.

Certain quaternary ammonium and related compounds cause plants to grow short and sturdy, with intense green foliar coloration; and experimentally they have prolonged the life of test plants, such as bean. The synthesis and chemistry of one of these compounds, Amo-1618, is described, as are the syntheses of structurally related compounds. Eight compounds were rated biologically as highly active; four were rated as moderately active, and nine were inactive, inducing no biological response in young bean seedlings. [Authors' abstract.]—Eastern Utiliz. Res. Dev. Div., U.S.D.A., Philadelphia 18, Pa.

2065. SCHIFFER, A. P., AND KOVÁCS, A.
**Tetragonin: a yeast growth-regulating substance from *Tetragonia expansa.***
*Nature*, 1959, **183**: 988-9, bibl. 1.

A water-soluble extract of New Zealand spinach in high concentration inhibited, and in lower concentration stimulated, the multiplication of *Saccharomyces* spp. Tetragonin is most highly concentrated in the roots of the plant: in young plants leaf juice is more active than stem juice, but, with age, stem juice activity increases and approaches that of the roots. Green unripe fruits show activity, but aqueous extracts of dry ripe fruits do not.

### *Air pollution.*

(*See also* 2097, 2435, 2483, 2753, 2917o.)

2066. HILL, A. C., AND OTHERS.
**Effects of atmospheric fluorides and various types of injury on the respiration of leaf tissue.**
*Plant Physiol.*, 1959, **34**: 11-16, bibl. 28.

Seven species of plants were grown under various atmospheric HF treatments for several weeks, but no direct effect on respiration was detected even at high concentrations. Physical injury to gladiolus leaves caused increased respiration in adjacent tissue. It is considered very unlikely that atmospheric fluorides in urban or industrial areas ever affect plant respiration, at least not without first causing obvious injury such as necrosis.

2067. GOVI, G., AND ERCOLANI, G. L.
Dannosi effetti dello "smog" sulle piante. (**Smog effects on plants.**)
*Progresso agric.*, 1958, **4**: 1109-16, illus.

The authors have studied the effects of sulphur dioxide fumes from factories at Bologna on the following plants: *Hordeum murinum*, lettuce, spinach, hydrangea and *Lamium purpureum* (red dead nettle). Their observations are set out and illustrated in colour.

### *Statistical design.*

2068. Pearce, S. C., and Freeman, G. H.
**A review of experimental design at East Malling, 1953-1958.**
*A.R. E. Malling Res. Stat. 1958*, 1959, **A42**: 67-72, bibl. 12.

During the 5-year period under review it has become clear that some of the trials planted at East Malling have suffered slightly from having designs too complex for the purpose for which they are intended, whereas the reverse has never been found. Changes have occurred in block and plot sizes, used for both top and small fruits. Experience has been gained on the use of systematic, i.e. non-randomized, elements in trials, the commonest application of this practice being the planting of whole rows with single varieties. In considering the number of levels of a factor (e.g. N fertilizer) required to provide a response curve doubt is expressed as to whether the 3 levels commonly used in the past are adequate; where a curve is likely to assume the form suggested by Mitscherlich, 4 levels may enable it to be examined fairly effectively. Other aspects of experimentation considered are the problem of effecting changes in treatments (e.g. sprays) in successive experiments on the same trial area and cases in which not all the treatments need to be replicated to the same extent.

2069. Pearce, S. C.
**Some recent applications of multivariate analysis to data from fruit trees.**
*A.R. E. Malling Res. Stat. 1958*, 1959, **A42**: 73-6.

Reasons are given for the recent interest at East Malling in multivariate methods of analysing data, and some results are presented relating to tree growth. Two constant factors were isolated, one a general growth factor and the other a balance between size records taken early in the life of the trees and those taken at grubbing. The former factor appeared to be distributed at random, but the latter to follow soil characteristics. [Author's summary.]

2070. Smith, F. L.
**Effects of plot size, plot shape, and number of replications on the efficiency of bean yield trials.**
*Hilgardia*, 1958, **28**: 43-63, bibl. 6.

Results showed that there was a reduction of least significant differences (LSD) with increasing plot size. An ideal LSD of 200 lb. per acre was seldom reached with 4 randomized replications, but with 8 and 12 replications LSDs were below 200 lb. per acre with all plot sizes. There was a slight, but not significant, advantage from using narrow plots compared with wide plots of the same area. F values between replications showed that, with 4 replications, $\frac{2}{3}$ were not significant at the 5% level, while with 12 replications only $\frac{1}{4}$ were not significant. Significant reductions of LSDs were obtained with 4 replications arranged in a Latin square over randomized blocks. Comparisons made with yield data showed that a greater reduction of LSD was obtained by increasing both plot size and the experimental area rather than by increasing plot size alone or by increasing the number of replications in a given experimental area. It is recommended that, to attain LSDs of 200 lb. per acre using randomized blocks, at least 6 replications should be provided.—Univ. Calif., Davis.

2071. Nonnecke, I. L.
**Yield variability of sweet corn and canning peas as affected by plot size and shape.**
*Diss. Abstr.*, 1958, **19**: 627, being *L.C. Card No. Mic.* 58-3815 of 89 pp.

In studies with canning peas the coefficients of variation for both vines and shelled peas decreased as plot length increased. The steadiest reduction in variation occurred in blocks of 1×6 plots. The optimum plot size in cost estimations for canning peas was found to be 5 ft.×10 ft. For quality studies with canning peas considerably more shelled peas were required for processing than could be obtained from plots of the optimum size for yield comparisons.—Ore. St. Coll.

### *Experimental techniques.*

(*See also* 2032, 2041, 2092b, h, i, t, u, x, y, 2093a, i, 2123, 2187f, 2355, 2367h, 2604, 2635, 2639, 2949, 2984, 2985.)

2072. Holland, D. A.
**Studies in the measurement of apple trees. IV. The use of branch girths to estimate tree size.**
*A.R. E. Malling Res. Stat. 1958*, 1959, **A42**: 77-9, bibl. 5.

The suggestion made in Part III of this series [*H.A.*, 26: 2399], to the effect that, where it is impracticable to estimate tree size by measuring trunk girths, branch girths might be substituted, has been examined empirically and found to be satisfactory in any of the circumstances in which the trunk girth would have been useful if available. The method of integration used was to divide the sum of the branch girths by the square root of their number, and the resultant figures were compared with those of trunk girth and weight recorded in grubbed trees from several trials.

2073. Dittmer, H. J.
**A method to determine the length of individual roots.**
*Bull. Torrey bot. Cl.*, 1959, **86**: 59-61, bibl. 6.

It is suggested that the length of an individual root can be estimated from a recovered portion of it by applying the following formula: $L=\frac{L_1\times d_1}{d-d_1}$ where $L$=the total projected length, $L_1$=the actual length of the recovered portion, $d$=the diameter of the root at the base of the plant and $d_1$=the diameter at the distal broken end of the root. Calipers graduated to tenths of a millimetre are suitable for measuring the diameters of larger roots, but an ocular micrometer in a compound microscope is needed for measuring diameters of less than 1 mm. In roots measured thus far and checked against actual lengths errors have been less than 10%.—Univ. New Mex., Albuquerque.

2074. Juniper, B. E.
**The surfaces of plants.**
*Endeavour*, 1959, **18**: 20-5, bibl. 8, illus.

The wettability of leaf surfaces varies from plant to plant and has considerable practical importance—the efficiency of chemicals applied to leaves may ultimately depend on it. New techniques in electron microscopy have made it possible to resolve the ultra-structure which largely determines wettability, and the techniques and results are discussed here. [Author's summary.] The author reproduces electron micrographs of carbon replicas of leaf surfaces ×10,850. Among leaf surfaces illustrated are those of *Chrysanthemum segetum*, *Kleinia articulata*, *Galanthus nivalis*, *Pisum sativum* and *Brassica oleracea* var. *capitata*. The effect of light on leaf surfaces is very noticeable in the photographs.

2075. Ackley, W. B., Crandall, P. C., and Russell, T. C.
**The use of linear measurements in estimating leaf areas.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 326-30, bibl. 10.

Correlation coefficients of various leaf measurements with area were determined for apple, pear, peach, grape, strawberry, raspberry and bean (bush and pole). Results showed that, for certain crops, simple length or width measurements can be used with reasonable accuracy to predict leaf area. A close correlation was found between the middle or terminal leaflet and the area of compound leaves, which suggests that the area of such leaves may be safely estimated from single linear measurements. The study described also included calculations to determine the minimum number of leaves to be measured to give a reliable linear measurement for area conversion. Required sample sizes are presented for the more useful comparisons between linear dimensions and area.—St. Coll. Wash., Pullman.

2076. (Jenkins, H. V.)
**[Measurement of leaf area.]**
*A.R. Waite agric. Res. Inst. S. Aust., 1956-57*, p. 10.

An apparatus has been constructed, which consists of a perforated plate (600 holes per sq. in.) mounted on an airtight drum connected to a constant speed suction pump. Leaves are sucked onto the plate and pressure within the drum increases in proportion to the leaf area. Measurement of pressure change gives a direct measurement of area.

2077. Trzcinski, T., and Lenger, A.
Influence de l'opérateur sur l'échantillonnage foliaire du pommier. **(The effect of the sampler in taking leaf samples of apple trees.)**
Trzcinski, T., Liard, O., and Lenger, A.
Contribution à l'échantillonnage foliaire du pommier. Échantillonnage au hasard. Échantillonnage dirigé. **(Contribution to leaf sampling in apple trees. Random sampling. Systematic sampling.)**
*Bull. Inst. agron. Gembloux*, 1958, **26**: 235-42, bibl. 6, and 243-80, bibl. 44.

Two biometric studies are described. The first shows the bias due to the human element in a simplified sampling method. The second compares random sampling with systematic methods and shows the former to be the best method of obtaining representative samples.

2078. Thompson, J. F., and others.
**Partition chromatography and its use in the plant sciences.**
*Bot. Rev.*, 1959, **25** (1): 1-263, bibl. 1466, illus.

This most comprehensive symposium provides detailed information on materials and techniques. First, general considerations are discussed and methods and materials are described by J. F. Thompson. Specific applications of partition chromatographic procedures are then dealt with as follows: Volatile plant constituents, by O. O. Silberstein; Non-volatile organic acids other than keto acids, by J. F. Thompson; Keto acids, by R. M. Krupka and G. H. N. Towers; Paper chromatography of sugars, by C. J. Morris; Phosphorylated compounds, purines and pyrimidines, by S. I. Honda; Paper chromatography of proteins, by J. F. Thompson; Amino acids, by G. E. Hunt; Paper chromatography of the *Nicotiana* alkaloids, by R. M. Zacharius; Paper chromatography of the auxins, by L. E. Powell, Jr.; and Pigments and related compounds, by J. F. Thompson.

2079. Butters, B., and Chenery, E. M.
**A rapid method for the determination of total sulphur in soils and plants.**
*Analyst*, 1959, **84**: 239-45, bibl. 5.

A statistical study of the use of turbidimetric measurements of sulphate as barium sulphate is described. Procedures are given for the determination of total sulphur in soils and plants, extremely pure magnesium nitrate being used to oxidize the organic matter. [From authors' summary.]—Kawanda Res. Stat., Uganda.

2080. Włodek, J., Lenartowicz, W., and Bystydzieńska, K.
Potencjometryczne oznaczanie kwasowości owoców. (**The determination of fruit acidity by potentiometer.**) [Russian and English summaries ½ p. each.]
*Prace Inst. Sadown. Skierniewice*, 1958, **3**: 197-218, bibl. 15.

Results of analyses of stone and soft fruits showed that titration by the glass electrode method was more objective than determinations based on the visual assessment of colour changes of indicators. The method is of practical value for field experiment stations.

### *Machinery and equipment.*

(*See also* 2092j, n, r, w, x, 2093b, k, 2251, 2771, 2816k, 2824, 2955, 2976, 2977, 3044, 3063, 3068e, 3071.)

2081. Cashmore, W. H.
**Progress in agricultural machinery.**
*J. Fmrs' Club*, 1958, pp. 116-27.

Though dealing specifically with agricultural machinery, this paper and the ensuing discussion are likely to be of more than passing interest to horticulturists, as indicating trends of investigation and work at the N.I.A.E., Silsoe.

2082. Fernqvist, I.
Sticklingförsök med fotocell-reglerad automatik. (**Propagation of softwood cuttings with photo-electric mist control.**) [English and Esperanto summaries 1 p. each.]
*Medd. Trädgårdsförs. Malmö* **120**, 1959, pp. 25, bibl. 12, illus.

A photo-electric cell mechanism, designed to control the intervals of intermittent mist application in the greenhouse, was tested at Alnarp over 2 seasons with satisfactory results. Tables show the rooting percentages obtained with softwood cuttings of ornamental shrubs, fruit tree rootstocks and gooseberry varieties. Both perlite and peat gave good results as rooting media.

2083. Schleusener, P. E.
**Drop size distribution and energy of falling drops from a medium pressure irrigation sprinkler.**
*Diss. Abstr.*, 1959, **19**: 1686, being *L.C. Card No. Mic.* 58-7106 of 90 pp.

The logarithm of the median drop mass varied linearly with distance from the nozzle, increasing rapidly with greater distance from the nozzle. An increase in pressure of 5 lb. per sq. in. had little effect on the size of drops falling within approximately 20 ft. of the nozzle. Changes in drop size caused by a change in nozzle pressure increased with distance from the nozzle. The logarithm of the energy imparted by drops from a sprinkler striking a target near the ground level varied linearly with distance from the nozzle, increasing rapidly with greater distance from the nozzle. Greatest amounts of energy were received from the drop spectrum from a $\frac{5}{32}$ in. diameter nozzle operating at 30 lb. per sq. in. Less energy was imparted by the drop spectrums from the remaining 3 combinations of nozzle size and pressure tested. True water application rates based upon the actual time of water application were as high as 7·5 in. per hour, being from 30 to 90 times as great as the application rates based upon total elapsed time.—Mich. St. Univ.

2084. Cosolo, S.
Forbici pneumatiche. (Nota preliminare.) (**Pneumatic secateurs. (Preliminary note.)**)
*Riv. Vitic. Enol.*, 1959, **12**: 55-6, illus.

An air compressor, either motor- or tractor-operated, pumps air into a storage tank connected by rubber pipes to 8–10 pairs of secateurs, in each of which the movable blade is connected by a spring to a piston working inside an air cylinder at the end of the handle, and is controlled by a sensitive trigger. The smallest secateurs weigh 800 g. and can cut 100 twigs of 2 cm. diameter per min. Other larger sizes are available for twigs of 3 and 5 cm. diameter, and also a saw for green boughs and trunks of 15 cm. The tubing can be carried on a high framework attached to the tractor for convenience in working in vineyards and young orchards.

### *Glasshouses.*

(*See also* 2092k, 2093d, h, 2552.)

2085. Neuray, G., and Nisen, A.
Possibilités d'utilisation des polyesters stratifiés en construction horticole. (**The possibilities of using laminated polyesters in horticultural construction.**)
*Bull. Inst. agron. Gembloux*, 1958, **26**: 117-34.

Six materials, made either from glass or polyester, were compared using radish and beans as test crops. Data are given for light, temperature, R.H. and plant growth. The growth of beans was better under glass than under polyester; differences with radish were less marked. In general, temperatures under polyester were satisfactory, but light transmission was less than with glass.

2086. de Vries, K. J.
Het centraal warmtebedrijf economisch bezien. (**The economics of a central system of heating.**) [English summary 7 lines.]
*Meded. Dir. Tuinb.*, 1959, **22**: 78-81, 111, bibl. 2.

Under certain conditions, which are discussed, a central system for heating several smallholdings has economic advantages for holdings up to a certain size (approx. 6,000 sq. m. heated glass) as compared with individual heating.

2087. Kazarian, E. A.
**Heating plastic greenhouses with bottled gas heaters.**
*Quart. Bull. Mich. agric. Exp. Stat.*, 1958, **41**: 381-7, illus.

Approximately 16 gal. of fuel per day were required to maintain an 18 ft. × 48 ft. double-layer plastic greenhouse at 60° F. throughout the winter. The type of construction and the width of the air space between the 2 plastic film covers had little effect on fuel consumption. The specific fuel consumption was reduced when a lower temperature was maintained in the house.

2088. Seeman, J.
Wärmesteuerung mit Luvatherm-Regler bei der Kultur von *Primula obconica*. (**Temperature control by the Luvatherm heat regulator in the cultivation of *Primula obconica*.**)
*Zbl. dtsch. ErwGartenb.*, 1958, Vol. 6, No. 11, Suppl. *Techn. im Gartenb.*, from abstr. in *InformDienst Weihenstephan*, 1959, No. 3, p. 30.

With the Luvatherm heat regulator temperature control is based on the supply of light. Following experiments carried out in two glasshouses the light-temperature regime chosen for *Primula obconica* was: at night 8° C., at 600 Lux 12° C., at 5,000 Lux 16° C., at 10,000 Lux and above 20° C. In comparison with a glasshouse kept at a constant temperature, plants in the glasshouses with the Luvatherm heat regulator had 52% more flowers and made much more vigorous growth. Furthermore fuel consumption was greatly reduced.

2089. Hely, F. W.
**Adjustable shading to modify glasshouse temperatures.** [French and German summaries ¼ p. each.]
*J. agric. Engng Res.*, 1959, **4**: 133-8, illus.

The construction and operation of external louvres are described. These enable considerable temperature reductions to be made without seriously reducing light quality or intensity. They are cheap and simple to operate, and the general effect on plant growth is beneficial. Supplemented by some evaporative cooling, louvre shading makes it possible to grow plants in glass tubes throughout the year.—C.S.I.R.O., Canberra.

### *Soil sterilization.*

(*See also* 2572, 2585, 2816h.)

2090. Morris, L. G., and Neale, F. E.
**Some experiments on the steam sterilising of soil. Part III. The passage of heat downwards below the point of injection. Part IV. The effect of covering the soil surface.** [French and German summaries ¼ p. each.]
*J. agric. Engng Res.*, 1959, **4**: 153-60, bibl. 5.

If the soil below the injection pipe was loosened sterilization to 1·5 times the depth of injection could be obtained, but there was no useful heat penetration into firm subsoil. The best soil covering was a thin plastic sheet which spread the steam. A 1-in. covering of crumbled peat reduced heat losses but left areas unsterilized on the surface.

2091. Wiebe, J.
**Phytotoxicity as a result of heat treatment of soil.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 331-8, bibl. 21.

After heat treatment of a greenhouse soil with a history of "sterilization toxicity", statistically significant correlations were obtained between any 2 of the following properties of water extracts: electrical conductivity, ammonium concentration, soluble organic-matter content, osmotic concentration and plant response (growth of pre-germinated cucumber seedlings during 24 hours). The closest correlation (negative) was found between osmotic concentration of the extract and growth response. The results indicate that heat treatment of the soil releases numerous organic and inorganic materials in soluble forms, which may raise the concentration of the soil solution to levels that are detrimental to plant growth, and that "toxicity" results primarily from physiological unavailability of the soil water due to the osmotic concentration of the soil solution.—Cornell Univ., Ithaca, N.Y.

### *Noted.*

2092.

a Beek, L. C. V.
**Effect of 2,3,6-trichlorobenzoic acid and 2,6-dichlorobenzoic acid on the geotropic and phototropic responses of seedlings of various species.**
*Plant Physiol.*, 1959, **34**: 61-5, bibl. 10, illus.
Repression of responses apparently associated with positions 2 and 6 of the benzene ring.

b Bingley, J. B.
**Simplified determination of molybdenum in plant material by 4-methyl-1,2-dimercaptobenzene, Dithiol.**
*J. agric. Food Chem.*, 1959, **7**: 269-70, bibl. 12.

c Boas, F.
Ernährung und pflanzliche Werte. (**Nutrition and nutritional values of plants.**) [English and French summaries 21 and 13 lines respectively.]
*Landw. Forsch.*, 1958, **11**: 274-8, bibl. 5, illus.
Gramineae, Cruciferae and Compositae found to contain few or no oxalic acid derivatives.

d BOLL, W. G.
**Inhibition of growth of excised tomato roots by 2-diethylaminoethanol.**
*Science*, 1959, **129**: 330-1, bibl. 11.

e BONNER, J.
**Protein synthesis and the control of plant processes.**
*Amer. J. Bot.*, 1959, **46**: 58-62, bibl. 26.
The structure, origin and role of microsomes reviewed.

f ČAJLAHJAN, M. H.
**Hormone factors in the flowering of plants.** [Russian, with English summary ½ p.]
*Fiziol. Rast.*, 1958, **5**: 541-60, bibl. 65, illus.
See *H.A.*, 29: 1041.

g ČAJLAHJAN, M. H.
**The effect of gibberellins on the growth and development of plants.** [Russian, with English summary ¼ p.]
*Bot. Žurnal*, 1958, **43**: 927-52, bibl. 45, illus.
See *H.A.*, 28: 2108.

h CHANDLER, B. V., AND SWAIN, T.
**Separation of anthocyanins from plant extracts.**
*Nature*, 1959, **183**: 989, bibl. 5.
In the presence of other flavonoid materials.

i CLAFFEY, J. B., AND OTHERS.
**An improved experimental unit for recovery of volatile flavors.**
[*Publ.*] *U.S. Dep. Agric.* **ARS 73-19**, 1958, pp. 7, bibl. 14, illus.
From various fruit juices.

j COURSHEE, R. J.
**Investigations on spray drift. Part I. The small drop component of sprays.** [French and German summaries 10 lines each.]
*J. agric. Engng Res.*, 1959, **4**: 144-52, bibl. 7, illus.
A sampler for hydraulic sprays described and tested.

k VAN DRENTH, A.
Temperatuurregeling in kassen met behulp van een buitenthermostaat. (**Temperature control in glasshouses with the aid of an external thermostat.**) [English summary 6 lines.]
*Meded. Dir. Tuinb.*, 1959, **22**: 89-91, 111, illus.

l FERBER, A. E.
**Windbreaks in conservation farming.**
*Misc. Publ. U.S. Dep. Agric., Soil Conserv. Serv.* **759**, 1958, pp. 22, illus.
Advice on uses, planning, planting and management of windbreaks.

m FLEMING, C. P.
**Irrigation for fruit production.**
*Tasm. J. Agric.*, 1958, **29**: 334-43, illus.
A discussion of water supplies and methods of irrigation.

n GREGORY, M.
**The design of spray irrigation schemes.**
*Tasm. J. Agric.*, 1958, **29**: 289-93, bibl. 4, illus.
Three designs and their costs simply outlined.

o HARA, N.
**Marginal growth of leaves.**
*Nature*, 1959, **183**: 1409-10, bibl. 10.
Variations in meristematic behaviour.

p JAMES, W. O., AND SLATER, W. G.
**The aerobic utilization of pyruvate in plant tissues.**
*Proc. roy. Soc. Ser. B*, 1959, **150**: 192-8, bibl. 13.
When labelled with $C^{14}$ and fed to tissues of mature apple fruits and to barley root tips.

q JARMAN, R. T.
**The deposition of wind-borne oil droplets on spheres.** [French and German summaries ⅓ p. each.]
*J. agric. Engng Res.*, 1959, **4**: 139-43, bibl. 12.

r KAKEBEEKE, J., SLITS, H. J. A., AND STENDER, J. A.
Het oogsten van tuinbouwprodukten in Amerika. (**Harvesting horticultural produce in America.**)
*Meded. Inst. TuinbTech.* **40**, 1959, pp. 52, bibl. 86, illus.
Mechanical developments in harvesting vegetables, fruits and bulbs.

s KOONTZ, H. V.
**Factors affecting absorption and translocation of foliar applied phosphorus.**
*Diss. Abstr.*, 1958, **19**: 422, being *L.C. Card No. Mic.* 58-3043 of 40 pp.
See *H.A.*, 28: 2123.

t VAN LIESHOUT, J. W.
De toepassing van radioactieve isotopen, in het bijzonder van $P^{32}$, bij het wortelonderzoek. (**The use of radioactive isotopes, in particular $P^{32}$, in root studies.**) [English summary ¼ p.]
*Landbouwk. Tijdschr.*, 1959, **71**: 22-9, 48-55, bibl. 13.
A review of methods and their advantages.

u McVey, D. V., and Gerdemann, J. W.
**A method for mounting roots to be photographed.**
*Plant Dis. Reptr*, 1959, **43**: 403, illus.
In water between two plates of glass in a horizontal frame.

v Mansurova, V. V., Saharov, V. V., and Hvostova, V. V.
**The sensitivity of diploid and auto-tetraploid plants to gamma-radiation.** [Russian, with English summary 9 lines.]
*Bot. Žurnal*, 1958, **43**: 989-97, bibl. 17.
Tetraploid forms of *Polygonum* and *Panicum* more resistant to injury from irradiation with $Co^{60}$ than diploid.

w Montgomery, F. H., and Riddell, R. T.
**An inexpensive plant growth chamber.**
*Canad. J. Plant Sci.*, 1959, **39**: 80-1, illus.
Designed so that temperature and humidity control may be added as finances allow.

x Morris, L. G.
**A recording weighing machine for the measurement of evapotranspiration and dewfall.** [French and German summaries 10 lines each.]
*J. agric. Engng Res.*, 1959, **4**: 161-73, bibl. 3, illus.
A self-balancing machine producing a continuous record of small changes in a large weight of soil.

y Munk, H.
Die Bestimmung geringer Mengen Magnesium in pflanzlichen Substanzen mit Titangelb. **(The determination of small quantities of magnesium in plant material by means of titanium yellow.)** [English and French summaries 20 and 16 lines respectively.]
*Landw. Forsch.*, 1958, **11**: 249-56, bibl. 12.
A colorimetric technique giving results in close agreement with other methods.

z Muskett, A. E.
**The Faculty of Agriculture.**
Reprinted from the *Annual Record for 1957*, Queen's Univ. Ass., Belfast, pp. 45-8.
Instructional and research facilities, horticulture being of minor importance.

2093.

a Nordby, A., and Steenberg, K.
**Application of radioactive plant protection chemicals for illustration and quantitative evaluation of spray deposits.** [French and German summaries ½ p. each.]
*J. agric. Engng Res.*, 1959, **4**: 174-80, bibl. 7, illus.
Studies of spray deposits on apple trees using a radioactive fungicide.

b Platts, H. C.
**Fixing-wires for wall plants.**
*Gdnrs' Chron.*, 1959, **145**: 42, 45, illus.
Fixing wires to walls by vine-eyes and the new vine-eye blocks.

c Raggio, N., Raggio, M., and Burris, R. H.
**Enhancement by inositol of the nodulation of isolated bean roots.**
*Science*, 1959, **129**: 211-12, bibl. 7.
Mesoinositol increased nodulation in agar cultures.

d Ruge, U.
Die lichtphysiologischen Grundlagen der Pflanzenbeleuchtung. **(The physiological basis of plant illumination.)**
*Angew. Bot.*, 1958, **32**: 207-20, bibl. 32, illus.
Sources of glasshouse illumination and plant responses to the spectra emitted.

e Sacher, J. A., and Glasziou, K. T.
**Effects of auxins on membrane permeability and pectic substances in bean endocarp.**
*Nature*, 1959, **183**: 757-8, bibl. 12.
Throwing light on the possible mechanism of auxin action.

f Schneider, M.
Agrarmeteorologische Bibliographie 1957. **(A bibliography of agricultural meteorology 1957.)**
*Bibl. dtsch. Wetterdienst.* **9**, 1958, pp. 92.
Containing 662 abstracts and noted titles.

g Sheard, S.
**Farmstead planning in Saskatchewan.**
[*Publ.*] *Sask. Dep. Agric.*, 1957, pp. 17, illus.
Aiming at utility combined with protection from the weather and attractiveness of appearance.

h Spice, H. R.
**Polythene film in horticulture.**
*J. roy. hort. Soc.*, 1959, **84**: 16-22, bibl. 10, illus.
Its uses as a glass substitute reviewed.

i Staniland, L. N.
**Fluorescent tracer techniques for the study of spray and dust deposits.** [French and German summaries ½ p. each.]
*J. agric. Engng Res.*, 1959, **4**: 110-25, bibl. 6, illus.

j Stowe, B. B., and Yamaki, T.
**Gibberellins: stimulants of plant growth.**
*Science*, 1959, **129**: 807-16, bibl. 156, illus.
A review.

k Yeo, D.
**Droplet size distributions from flat-spray nozzles fitted to aircraft.** [French and German summaries 17 lines each.]
*J. agric. Engng Res.*, 1959, **4**: 93-9, bibl. 10.

l YOUNGMAN, B. J.
**"Parsnip" dermatitis.**
*Kew Bull.*, 1958 (issued 1959), No. 3, pp. 387-90, bibl 15.
Notes on afflictions caused by *Heracleum* spp. and other Umbelliferae.

m ZABKA, G., GREGORY, F. G., AND EDELMAN, J.
**Dark fixation of carbon dioxide in *Kalanchoë blossfeldiana* in relation to photoperiodism.**
*Nature*, 1959, **183**: 1375-7, bibl. 4.
Earlier work was noted in *H.A.*, 24: 3443j.

## TREE FRUITS, DECIDUOUS.

### *General.*

(*See also* 2021, 2025, 2072, 2186b, 3083, 3089, 3094, 3112.)

2094. SOCIÉTÉ POMOLOGIQUE DE FRANCE.
*Congrès pomologique 3-6 Oct. 1957.* **(Proceedings of the French pomological congress held in October, 1957.)** Toulouse, 1958, pp. 323, illus.

At this Conference reports were made by the Committees on Plant Protection, Pomology and Nutrition. Papers of French rather than general interest were given on fungus diseases of plums and peaches, fruit production in the Garonne Valley and in Haute-Garonne, irrigation, codling moth in the Agen district, the Toulouse market, the desirability of mapping fruit districts, and on a proposed new Governmental fruit decree which would regulate the future production of fruit in France, a discussion of which incidentally generated much heat at the conference. Three articles concerned soil management, one of them dealing with machinery used, another with conditions in the fruit valleys of the Pyrennees and a third with the respective merits of mulching or working the soil in orchards. Further papers were given on peach growing and varieties in Italy and on the control of the red plum maggot (*Laspeyresia funebrana*) and the oriental fruit moth (*Cydia molesta*) [for the last two see abstracts 2342 and 2344]. Further, French readers may be interested in the descriptions of most of the E.M., Merton and M.M. apple rootstocks, which appear as part of the report of the Pomology Committee.

2095. (FRENCH, A. P.)
**Department of Pomology.**
*A. R. Mass. agric. Exp. Stat. 1956-7*, being *Bull.* **503**, pp. 46-8.

*Scald.* Diphenylamine (DPA) at 2000 p.p.m. sprayed within 24 hours of harvest controlled scald in apples as satisfactorily as 1 and 3% mineral oil sprays. For controlling pre-harvest drop a single application of 2,4,5-TA was inferior to a single application of 2,4,5-TP or two applications of NAA. *Packing.* Fruit suffered more damage in the Eastern apple box than in cell cartons or polyethylene bags, most of the damage occurring in lidding. *Herbicides.* Monuron at 2 lb. per acre controlled all weeds except quack [couch] grass in cultivated blueberries. Monuron plus diuron plus kerosene suppressed quack grass temporarily. Polyborchlorate, although somewhat injurious to lowbush blueberries, continued to offer promise for the control of bracken and many other weeds in this crop. *Blueberry nutrition.* Analysis of leaf samples from 54 plots showed that leaf N levels varied most, K levels slightly and P levels very little. Mg levels were high in all plots. *Strawberry black root rot.* EDB proved a better soil fumigant than D-D.

2096. VICTORIA DEPARTMENT OF AGRICULTURE.
***Tatura Horticultural Research Station Guide Book,*** 1958, pp. 29, illus.

An account of this rapidly growing fruit research station in the Goulburn Valley, the heart of one of the largest fruit growing areas in Australia, is very welcome. It now covers 50 acres and has a staff of 40 devoted to research and to advisory and field work. The main problems at present under study are here set out. They include soil research, land use and irrigation, soil management and fertilizers for peaches and pears, rootstocks for pears, apples, apricots and in the near future for peaches, peach varieties, training peach trees, thinning peach trees. There are numerous other trials, including some which concern tomatoes.

2097. ITAKURA, T.
**Survey on the radioactive contamination of fruits and leaves of various fruit trees.**
*Res. Effects Influences Nuclear Bomb Test Explosions, I. Ueno.* Tokyo, 1956, pp. 693-6, from *Ref. Ž.* (*Biol.*), 1958, No. 2, Abstr. 5, 957.

After the H-bomb test at the Bikini atoll the radioactivity of the leaves of fruit trees in Japan was much higher than that of the fruits, reaching in some cases 100-200 imp./min. in 3 g. of dry leaf matter. Contamination of the fruit was limited to the outer parts, the flesh being practically unaffected. Nevertheless washing with water did not remove the radioactive contamination of the pericarp.

### *Breeding and varieties.*

(*See also* 2168, 2186h, j, o, u, y, 2187c.)

2098. MURAWSKI, H.
Beiträge zur Züchtungsforschung beim Apfel. IV. Weitere Untersuchungen zur Züchtung von Apfelsorten mit spätem Laubaustrieb und Blühbeginn. **(Apple breeding investigations. IV. Further studies on breeding apple varieties with late leafing and flowering.)**
*Züchter*, 1959, **29**: 72-8, bibl. 10.

Late leafing and flowering are genetically determined. The two characteristics are linked in seedlings of the late-flowering variety Taffetapfel. Flowering periods are shown on spring temperature charts for 7 varieties for 4 consecutive years. [For part III, see *H.A.*, 29:1176 f.]

2099. Lombardi, P. L.
Cultivar di *Morus alba* e *M. nigra* esistenti nella stazione agraria sperimentale di Ascoli Piceno. (**Mulberry varieties at the Ascoli Piceno Research Station.**]
*Ann. Sper. agrar.*, 1958, **12**(6), Suppl. pp. LXIII-LXX, illus.

Illustrated descriptions are given of 20 Italian mulberry varieties, 20 Chinese and Japanese varieties imported in 1934, 3 seedlings and 3 very important Japanese varieties imported in 1955/56.

2100. Žavoronkov, P. A.
**Selection of hardy pear varieties in the southern Urals.** [Russian.]
*Agrobiologija*, 1958, No. 4, pp. 80-6.

Regular selection of original forms of the Ussurian pear, their crossing with southern and mid-Russian varieties and directed training of the hybrids resulted in the development of varieties of good quality that were sufficiently hardy for the Urals. Particular promise was shown by hybrids obtained from crossing the Ussurian pear with summer and autumn varieties such as Williams', Clapp's Favourite and Lesnaja Krasavica [Forest Beauty].

2101. Ven'jaminov, A. N.
**Fertile hybrids between the domestic and eastern species of plum.** [Russian.]
*Agrobiologija*, 1958, No. 4, pp. 68-72.

This paper includes a short description of 3 hardy fertile hybrids named Evrazia [Eurasia] 1, 2 and 3, in which are combined the characters of *Prunus domestica*, *P. salicina* and *P. americana*. Work involving the use of *P. ussuriensis* and *P. besseyi* is also mentioned.

2102. Murawski, H.
Beiträge zur Züchtungsforschung an Pflaumen. II. Weitere Untersuchungen über den züchterischen Wert von Sämlingen der Kirschpflaume, *Prunus cerasifera* Ehrh.) (**Contributions to research on plum breeding. II. Further studies on the breeding value of seedlings of cherry plum.**)
*Züchter*, 1959. **29**: 21-36, illus.

The morphology, pomology and cytology are discussed of *Prunus cerasifera* seedlings resulting from cross and self pollinations carried out for the most part in Turkey. Some of the seedlings were easily propagated by cuttings, including some hardy ones and a tetraploid type (BIV,19,13) which shows promise as a stem builder. Other seedlings with good fruit quality will also be used in further breeding work. [See also *H.A.*, 25: 140.]—Inst. f. Acker u. PflBau, Müncheberg.

### *Propagation and rootstocks.*

(*See also* 2082, 2145, 2146, 2153, 2167, 2263, 3074.)

2103. Lalatta, F.
Sementi ortofrutticole. La postmaturazione dei semi nelle specie arboree da frutto. (**Horticultural seeds. Ripening of seeds of tree fruit species.**)
*Sementi elette*, 1959, **5**(1): 65-6.

A discussion of the post-harvest period necessary before seeds of different fruit species will germinate. The following periods are said to be necessary:—almond 5-6 weeks, apple and pear 8-9 weeks, grape 3-4 months, walnut about 4 months, peach 4-5 months, apricot 4-5 months, plum 5 months, medlar 5-6 months and cherry 5-6 months. Medlar seeds were found to germinate better if first immersed in strong sulphuric acid for ½ hr. and then rinsed, while hawthorn seeds need more than 2 hours immersion. Olive stones on separation from ripe olives are first washed in a 5% soda solution before stratification in sand and later sowing. Another method is to treat them with hot water for 5-6 days and then leave them in wet sand for about a month.

2104. Stančević, A. S.
Uticaj odgajivanja voćnih sadnica bez pinsiranja na poboljšanje njihovog kvaliteta i smanjenje proizvodnih troškova. (**The effect of handling nursery trees without pinching on their quality and the cost of production.**) [English summary 1½ pp.]
*Arh. poljopr. Nauk.*, 1956, **9**: 61-72, bibl. 11, illus.

Three stem treatments were tested with young apple, pear, cherry and plum trees, viz. shortening the laterals, bud removal throughout the season, and removing the laterals in August. The most economic method was bud removal, and trees produced by this method were 22% cheaper than by the standard lateral-shortening method. The average stem diameter of trees from which buds were removed was, in general, slightly greater than that of trees with shortened laterals.—Inst. Fruit Growing, Čačak.

2105. Pavićević, M., and Mišić, P. D.
Ispitivanje mogućnosti prevodjenja voćaka na sopstveni koren putem specijalnog načina kalemljenja. (**A study of a possible method of propagating fruit trees on their own roots, by a special method of grafting.**] [English summary ½ p.]
*Arh. poljopr. Nauk*, 1958, **11**: 126-32, bibl. 8, illus.

A method of nurse-root grafting is described, which resulted in about 40% rooting of Jonathan and

Delicious scions. With Rome Beauty, Rote Bellefleur, Rheinischer Krummstiel and Lugdenburger apples the rooting percentage was 4-25%, and with Lotkirsche sour cherry it was 13%. No rooting was obtained with 6 pear varieties, nor with apricot, peach or sweet cherry varieties.—Inst. Fruit Growing, Čačak.

2106. Kuznecov, M. D.
**Determining the optimum growing conditions for apple seedlings in nutrient blocks.** [Russian, with English summary 3½ lines.]
*Izv. Timiryazev. seljsk. Akad.*, 1958, No. 6, pp. 59-72, illus.

A detailed study was made of raising apple rootstocks from seed in nutrient blocks. Friable soil mixtures with a pH of 5·5-6·0 and a high nutrient status and to which small doses of fertilizers were added proved the best; the inclusion of bulky material such as wood shavings or chopped straw was satisfactory, but sawdust was not. Rectangular blocks were superior to cylindrical ones, the dimensions 5×5×7 cm. or 7×7×7 cm. being most suitable. Emergence and seedling development were best when the seed was about to germinate or showed 0·5 cm. growth at the time of sowing, and also when those showing 2 cm. growth had their radicles cut back to ⅓ of their length. Correct placement of seeds improved germination, vigour and straightness of roots. The best place to grow the seedlings before planting out was a hot bed or, for the first 20-25 days, a glasshouse. Seedlings grown in groups in the nutrient blocks showed better initial development after planting out, but later the individually raised seedlings overtook them and produced the best quality plants. When methods of planting out were compared, the most vigorous growth resulted from crushing the upper ⅓ of the soil block without disturbing the lower part adhering to the roots.

2107. Preston, A. P.
**Apple rootstock studies: growth and cropping of Cox's Orange Pippin on some Malling and Malling-Merton rootstocks.**
*A.R. E. Malling Res. Stat. 1958*, 1959, **A42**: 47-52, bibl. 11.

The growth and cropping of 13-year-old trees of Cox's Orange Pippin on 5 new apple rootstock clones are reported. They were Malling-Merton 104, MM106, MM.109, MM.111 and M.XXV. These were compared with trees on M.IX, M.VII, M.IV, M.II and M.XVI in trials on a loam soil (Malling Series) and duplicated on a sandy soil (Bearsted Series). All trees were lightly pruned by the regulated method. Trees on MM.106 were almost identical in size and cropping with those on M.VII on the loam soil. On the sandy soil trees on MM.106 were smaller than those on M.VII, though considerably larger than on M.IX. MM.111 made trees equal in size to those on M.II but were heavier cropping. On loam, trees on MM.109 and M.XXV were similar in size to those on M.XVI but were heavier cropping. Trees on M.XXV were outstanding, within their vigour group, for early cropping. Trees on MM.104 were somewhat larger than those on M.II, and yielded more heavily; they were as heavy bearing as those on precocious M.IV during the early years, and by the fourteenth year had surpassed them. This rootstock has given an outstandingly good performance, making well anchored trees free from suckering and which have responded well to the light, labour-saving method of pruning used in these trials. [Author's summary.]

2108. Raphael, T. D.
**Notes on clonal apple rootstocks in Tasmania.**
*Tasm. J. Agric.*, 1958, **29**: 347-53, bibl. 10, illus.

As nursery stocks and for ease of propagation M.XIII and XXV and MM.102 and 107 are the most commendable and Crab C the most difficult; M.XV also is sometimes slow. The largest trees to date have been produced on M.XII, XIII, XV and XVI and the smallest on M.IX and MM.102, both of which are, however, the most precocious. M.II, though more vigorous than the latter, has consistently produced small trees, and in most instances has borne highly-coloured fruit. There appear to be certain affinities between varieties and stocks, the case of Granny Smith on M.I being an example of interest. [From author's summary.]

2109. Zielinski, Q. B.
**Some factors affecting seed germination in sweet cherries.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 123-8, bibl. 15.

Notching on the side through the seed coat, and notching plus hydrogen peroxide treatment significantly increased seed germination of Royal Ann (Bigarreau Napoleon), but Lambert did not respond to these treatments. Seeds harvested 50 days after flowering germinated poorly or not at all, but seeds of Lambert harvested 90 days after flowering showed very high germination percentages. With alternating temperatures (between 35·5° and 40·5° F.) stratification was more successful with both varieties than at a constant temperature (38° F.). Stratification for 120 days before field planting resulted in higher germination than direct field planting or than greenhouse planting after stratification. Results with seeds pitted at harvest and planted direct in the field were less satisfactory than with stratified seeds.—Ore. agric. Exp. Stat., Corvallis.

2110. Fogle, H. W.
**Effects of duration of after-ripening, gibberellin and other pretreatments on sweet cherry germination and seedling growth.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 129-33, bibl. 3, illus.

Fermentation had a deleterious effect on the viability of sweet cherry seeds. Storage of both moist and dried seeds at 70° F. reduced emergence to practically nil. Germination of Bing seeds without after-ripening was nil, but increased to 83% following 6 months' after-ripening at 37° F. (±3° F.). When seeds were soaked for 24 hours in 100 p.p.m. gibberellin immediately after collection, germination percentages of up to 75% were obtained, but the seedlings showed severe rosetting. Rosetting was overcome by foliar sprays of gibberellin applied at 3-week intervals. Gibberellin treatment combined with after-ripening (before or after) gave similar germination percentages. A treatment of 2-4 months after-ripening followed by a gibberellin soak is considered to be the most practical method of promoting cherry seed germination.—Irrig. Exp. Stat., Prosser, Wash.

2111. Polikarpov, V. P.
**Some production and biological characteristics of cherry trees raised from rooted softwood cuttings.** [Russian, with English summary 2 lines.]
*Izv. Timiryazev. seljsk. Akad.*, 1958, No. 6, pp. 93-104, bibl. 6, illus.

Cherry trees raised from cuttings treated with IBA tend to have multiple stems, resulting in dense crowns requiring elaborate pruning. The 4 varieties studied and described here had shallower and less vigorous root systems when raised from cuttings than when grafted. The multiple stem system was found to protect the stems from winter scald by binding the snow cover; hence selection in the nursery of plants with 2-4 stems is recommended.

2112. Malafij, I. T.
**Summer sowing of mulberry with freshly harvested seed.** [Russian.]
*Lesn. H-vo*, 1957, No. 5, p. 76, from *Ref. Ž.* (*Biol.*), 1958, No. 2, Abstr. 6,273.

The advantage of sowing freshly harvested, mature or semi-mature mulberry seeds in summer was demonstrated in the Ukraine during 1952-1956, Using 400-600 seeds per sq. m. (10-12 kg./ha.), 500,000-700,000 seedlings per ha. were obtained. The seedlings reached a height of 10-15 cm. before the winter, overwintered successfully under a snow cover and were transplanted the following season.

2113. Rahmanberdyev, K.
**Propagation of mulberry by cuttings.** [Russian.]
*Soc. S.H. Uzbekistana*, 1957, No. 2, pp. 68-71, from *Ref. Ž.* (*Biol.*), 1958, No. 2, Abstr. 6,272.

In Central Asia the best rooting (81·4%) was obtained with cuttings from juvenile plants. Cuttings from hybrids rooted readily, and during one season the plants reached heights of 120-175 cm. Cuttings 40 cm. long, laid horizontally, produced several plants.

2114. Mielczarek, J.
Obserwacje nad wegetatywnym rozmnażaniem morwy. (**Observations on the vegetative propagation of mulberry.**) [Russian and French summaries.]
*Prace Inst. Jedwabiu natur.*, 1957, **1**(1): 10-34, from *Ref. Ž.* (*Biol.*), 1958, No. 2, Abstr. 6,271.

Trials in Poland in 1952-1956 showed that the most reliable method of mulberry propagation was layering in the spring. Propagation by seed was suitable only for breeding purposes, and the use of leafy cuttings has not yet been found worth while. Bench grafting in the winter and modified Italian (bark) grafting were satisfactory.

2115. Posnette, A. F., and Cropley, R.
**A selection of Williams' Bon Chrétien pear compatible with quince rootstocks.**
*A.R. E. Malling Res. Stat. 1958*, 1959, **A42**: 91-2, bibl. 9, illus.

Trees of Williams' Bon Chrétien [Bartlett] on Quince A rootstocks were propagated from 3 scion sources, English, French and Swiss. The structure of the graft unions differed, the English source being highly incompatible, the French slightly incompatible and the Swiss compatible. Both compatible and incompatible unions were formed by different scions of Williams' grown on the same stock for 4 years. This evidence that the cause of incompatibility is not graft-transmissible suggests that bud mutation, rather than virus infection, is responsible for the differences. [Authors' summary.]

2116. Mowry, J. B.
**Rootstocks for propagating *Prunus* selections.**
*Fruit Var. hort. Dig.*, 1958, **13**(2): 23-5, bibl. 1.

The American plum was a compatible rootstock for cherries, plums, cherry-plum hybrids and chokecherries. The Manchu cherry (*P. tomentosa*) was highly specific for Manchu cherry selections. Myrobalan was compatible with plums, cherry-plum hybrids and almond selections, and mahaleb was compatible with cherries and chokecherries. The Japanese plum (*P. salicina*) was successfully budded with some plums and almonds, and peach with almonds and a few plum selections.—Ill. hort. Exp. Stat.

### *Climatic effects.*

(*See also* 2147.)

2117. Muromcev, I. A.
**The reaction of root growth to changes in temperature.** [Russian.]
*Tr. Plodoovočšn. In-ta im. I.V. Mičurina*, 1956, **9**: 39-49, from *Ref. Ž.* (*Biol.*), 1958, No. 9, Abstr. 38,942.

In seedlings of apple, cherry, plum, apricot and peach grown in nutrient solution, changes in the rate of root growth were registered automatically, at 2–5 min. intervals, by a special apparatus. Within a range of 5 to 50° C. each rise in temperature caused a brief, sharp acceleration of root growth followed by a rapid decline. At 7, 16 and 22° C. growth was then re-established at a higher level than before the rise in temperature; the depression was smallest at 22° C. At 35° C. and above a strong acceleration of growth was followed by a deep depression, and at 60° C. by the death of the roots.

2118. Mišić, P. D.
Uticaj meteoroloških elemenata na početak fenofaze cvetanja nekih sorti jabuka. (**The effect of climatic conditions on the start of flowering of certain apple varieties.**) [English summary 1 p.]
*Arh. poljopr. Nauk.*, 1956, **9**:37-48, bibl. 14.

Temperature sums were calculated for several apple varieties from January 1 to the start of flowering. The sums were smallest in dry, windy seasons. With Jonathan and Yellow Belleflower the temperature sums were about 14° C. higher on seedling stocks than on M.IX. Varieties with relatively low temperature requirements for the start of growth were often the slowest to flower. The value of estimating the probable time of flowering is discussed.—Inst. Fruit Growing, Čačak.

2119. Tamás, P.
Über die Ursachen der Zusammenhänge zwischen Temperaturgestaltung und Aufblühdaten von Obstgehölzen sowie über die Temperaturempfindlichkeit der Pflanzen. (**Causes of the relationship between temperature variation and flowering dates of fruit trees; temperature sensitivity of plants.**)
*Züchter*, 1959, **29**: 78-91, bibl. 30.

The "B" and "C" formulae of the Pearce and Preston temperature-sum system gave much less accurate forecasts of the flowering dates of Bramley's Seedling apples at Balsgård, Sweden, than at East Malling. Of the 5 temperature-sum systems compared for forecasting flowering dates in 300 varieties of apples and pears, that of Herbst and Weger gave very accurate results in 3 of the 4 test years, and had the smallest error of the 5 systems in an abnormal year. There was no evidence for the theory that the flowering date is influenced by temperatures in June of the previous year.

2120. Pieniążek, J., and Wiśniewska, J.
Studia nad okresem spoczynku zimowego siewek Antonówki. (**Studies on the winter rest period of Antonovka seedlings.**) [Russian and English summaries 1½ pp. each.]
*Prace Inst. Sadown. Skierniewice*, 1958, **3**: 130-48, bibl. 18, illus.

Apple seedlings kept at 0–5° C. from November to January showed normal growth 4 to 8 days after being brought into warmth and light. Seedlings which grew best in the orchard were those which had been kept in the laboratory without additional light during the winter followed by 5 weeks' cold storage; seedlings given the same treatment, but with additional light during the winter, formed only the top rosette of leaves. Dormant seedlings kept in cold storage for 20 days, before being placed in additional light at room temperature, formed summer growth and an additional growth ring. Without extra light this type of growth did not occur until after 50 days of cold storage. Three-year-old Antonovka seedlings grown continuously in long days formed the summer type of shoot growth only.

2121. Crossa-Raynaud, P.
Effets des hivers doux sur le comportement des arbres fruitiers à feuilles caduques. (**The effect of mild winters on the behaviour of deciduous fruit trees.**)
*Ann. Serv. bot. agron. Tunis.*, 1955 (issued 1958), **28**: 1-22, bibl. 27, illus.

In general, stone fruits in Tunisia sprouted normally following exposure to 400 hours of temperatures below 7·2° C. before mid-February. Peach varieties which are resistant to mild winters have been introduced into Tunisia for trial.

2122. Ionova, M. A.
**The duration of dormancy in apricots in the central zone.** [Russian.]
*Doklady vsesojuz. Akad seljsk. Nauk*, 1958, **21**(12): 19-22, bibl. 10.

In the Mičurinsk area the apricot has a very short period of deep dormancy, followed, from the end of October or the beginning of November, by a state of enforced dormancy due to low temperatures. Dormancy is first broken in the buds of the collar and stem and later in the vegetative buds of 1-year-old shoots. The flower buds have a shorter dormant period than the vegetative buds, and, in general, those parts of the plant characterized by low frost resistance emerge first from dormancy. To complete the dormant stage trees require a definite period with mean daily temperatures ranging from +10° to −6° C.

2123. Brown, D. S.
**A comparison of the temperatures of the flower buds of Royal Apricot with standard and black bulb thermograph records during the winter.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 113-22, bibl. 1.

Thermocouple readings from apricot buds taken in the autumn and winter were compared with readings from one thermograph within a shelter and with another (a distance recorder) with the sensitive bulb painted black and exposed 2 feet above the shelter. The shelter thermograph records represented the daily maximum and minimum bud temperatures better than the black bulb thermograph, but the latter reflected the mean bud temperature more accurately. It was concluded that the black bulb thermograph reflected diurnal variations and distribution in actual bud temperatures more accurately than the shelter thermograph.—Univ. Calif., Davis.

2124. Tukey, L. D.
**The influence of night temperature on the development of the fruit of the sour cherry (*Prunus cerasus* L., var. Montmorency).**
*Diss. Abstr.*, 1959, **19**: 1890-1, bibl. 12, being *L.C. Card No. Mic.* 58-779 of 61 pp.

In sour cherries growing at different night temperatures fruit size at the end of each stage of fruit development was similar, except for cherries grown at 91·2° F. during Stage III [see *H.A.*, 5: 188] which resulted in slightly smaller fruits. As the night temperature increased, the duration of Stages I and II decreased while that of Stage III increased. The effect of night temperature was more marked during Stage I than during Stage III. Fruits grown at the highest night temperatures (91·2° F.) were poorly coloured with a low percentage of sugar. Sucrose contents were highest at the lowest night temperature. It is suggested that increases in night temperature during Stage III restrict fruit development by limiting the amount of available sugars, while an increase in the respiration rate also tends to deplete sugars. The amount of photosynthates produced in the leaves was also reduced by high night temperatures. A system of heat units could not be used to predict the completion of a stage in fruit development.—Ohio St. Univ.

### *Soil problems and management.*

(*See also* 2092m, 2143, 2186f, x, 2187e, 2819.)

2125. Thompson, J. A.
**The occurrence of areas of poor growth in a fruit tree nursery.**
*A.R. E. Malling Res. Stat. 1958*, 1959, **A42**: 80-2, bibl. 4, illus.

A field at East Malling was brought into use as a nursery in 1941 and in the following 2 years established in stool and layer beds of apple, quince, plum and cherry rootstocks. Grubbing began in the winter of 1948/49 and was completed in 1952/53. Thereafter the whole field was used for arable crops for 5 years, with a heavily-manured crop of cocksfoot grown for seed occupying the land for 3 of the years. At the end of this period the area was once again used as a nursery, but the rows were planted at right angles to those used in the earlier nursery. In 1958 it was observed that there were bands of plants at right angles to the rows, which had made only half to two-thirds the growth made by comparable plants on either side of them. The effect was most pronounced with apples and was also marked with quinces, cherries, and some plums, but no such effect was evident with myrobalans, currants or gooseberries. Comparison between the old and new nursery planting places showed that the areas showing poor growth in the new nursery had carried related species in the old nursery.

2126. Börner, H.
**The apple replant problem. I. The excretion of phlorizin from apple root residues.**
*Contr. Boyce Thompson Inst.*, 1959, **20**: 39-56, bibl. 32, illus.

The addition of as little as 1 g. of dried apple root bark to 500 ml. of nutrient solution caused a strong reduction in the growth of apple seedlings in water cultures. Five phenolic substances were identified, viz, phloretin, *p*-hydroxyhydrocinnamic acid, phloroglucinol, *p*-hydroxybenzoic acid and phlorizin. Only the latter occurred naturally in the bark and wood of apple roots, the others being probably breakdown products. These chemicals retarded the growth of apple seedlings in water cultures at concentrations as low as $10^{-4}$ M. The strongest inhibition was caused by phlorizin and phloretin; phloroglucinol had only a slight effect. [See also *H.A.*, 28: 3461.]

2127. Val'kov, V. F., and Negovelov, S. F.
**Soil compaction and the longevity of fruit trees.** [Russian.]
*Sad i Ogorod*, 1958, No. 11, pp. 42-3.

The density of soil suitable for fruit tree cultivation varies over a relatively wide range, i.e. 1·18 to 1·55. The descending order of tolerance of soil compaction was found to be plum, apricot, apple, pear and cherry. Soil compaction is less harmful on slopes than on level ground.

2128. Rubin, S. S., and Gorbatjuk, D. A.
**The depth of soil cultivation in orchards.** [Russian.]
*Sad i Ogorod*, 1958, No. 11, pp. 36-9, bibl. 5, illus.

In apple orchards of the Umansk province a comparison was made of interrow cultivation to depths of 12, 18, 22 and 27 cm. Ploughing to 18 and 22 cm. improved growth and increased yields by 10 and 19% respectively compared with 12 cm. Ploughing 27 cm. deep in some years reduced growth compared with 18 cm. but slightly increased yields. Thus in pome fruit orchards on chernozem soils with sufficient root penetration ploughing 20–22 cm. deep is considered to be best. The soil along the actual tree rows should be cultivated to a depth of 8–12 cm.

129. Włodek, J., and Włodek, L.
Wyniki badań nad wartością nawozowa roślin okrywowych i resztek pożniwnych mieszanek strukturotwórczych w sadzie w Sinołęce. **(Results of trials on the fertilizing value of cover crops and post-harvest remains of different grass mixtures in the orchard at Sinoleka.)** [Russian and English summaries 1¼ pp. each.]
*Prace Inst. Sadown. Skierniewice*, 1958, **3**: 219-36, bibl. 19.

he remains of a short-term sod mixture, predominantly ryegrass with some clover, contained 1·2 kg. N/ha. in 1953 and 136·8 kg. N in 1954. he C/N ratio was 15/17 in the tops and 21/24 n the roots. In 1956 when the amount of clover ad increased to 50% the N content after cutting as 109 kg./ha. The C/N ratio was 10/7 in the tops nd 13/9 in the roots; the ratio of $N:P_2O_5:K_2O$ n the plants was 1: 0·22: 1. The manurial value of over crops varied with the amount of shading by he trees. In 1953 a cover crop included 21% unflower, 52% mustard and 17% yellow lupin, nd this contributed 66·9 kg. N/ha., most of which ame from the tops. In 1954 when the cover crop mixture was 60·7% lupin with weeds (mostly *Chenopodium*) the tops contributed 136·8 kg. N/ha., and he roots contributed 69·2 kg. N/ha. The growth of he cover crop plants, especially of the tops, was pressed by the shade of the apple trees. Weed rowth (in which *Sinapis arvense* predominated) ad a manurial value of 57·3 kg. N/ha., whereas a xture in which *Chenopodium* predominated produced 23·5 kg. N/ha. The N content of a grass-gume mixture sown at the beginning of July was 8·6 kg./ha. in October.

130. de Leenheer, L., and others.
Influence de travaux annuels superficiels dans les vergers à hautes tiges. **(The effect of light annual cultivation on top fruit orchards under grass.)**
*Rev. Agric. Brux.*, 1958, **11**: 1623-38.

bservations were made in a grass orchard of 5-year-old apple trees, variety Jacques Lebel, on rowth and production and on soil phenomena and erbage following tillage as compared with no ultivation. Treatments were given from March 953 to May 1955 as follows:—To both control nd trial plots on 11.3.53 1,000 kg. 14% supers, 00 kg. patent kali [potash] and 300 kg. 21% mmonium nitrate per ha. On 12.3.53 the trial lot was ploughed. On 25.3.53 it was resown with kg. white clover, 4 kg. hybrid clover, 2 kg. English ye grass (type 1), 4 kg. English rye grass (type 2). n 16.3.54 it was worked with a rotavator. On 4.5.54 it was harrowed and was sown with 1 kg. adino clover, ½ kg. trefoil, ½ kg. hybrid clover nd 1¼ kg. white clover. Samples of soil and erbage were taken from both plots on 10.9.54 and 30.12.54. In April 1955 both plots received (per ha.) 500 kg. fertiphos, 400 patent kali and 400 kg. ammonium nitrate. In the same month the trial plot was rotavated and on 3.5.55 it was then seeded, this time with 10 kg. each of *Poa trivialis* and *Agrostis alba*. Samples were again taken on 10.9.55, 3.4.56 and 12.7.56. Briefly, the treatments resulted in an improvement of stability in soil aggregates and in volume of soil pores at the end of two years, in considerably increased fruit production, but in an actual comparative reduction in tree girth over the same period. *Poa trivialis* and *Agrostis alba* showed a marked degree of spontaneous regeneration following superficial cultivation.

2131. Pelipenko, F. G.
**Chick peas in young orchards.** [Russian.]
*Sad i Ogorod*, 1958, No. 11, pp. 46-7.

Of numerous species grown as inter-crops in a young apple orchard in the Kuban, legumes reduced shoot growth the least. When bands of chick peas were sown, leaving a strip of soil 3 m. wide along the tree rows bare, the growth of apple and pear trees was similar to that on clean cultivated plots and a good crop of peas was harvested. Growing *Phacelia* in the inter-rows gave similar results and, in addition, provided a good source of honey.

2132. Dobrescu, V.
Comportarea caisului pe terenurile in pantă de la G.A.S. Saligny. **(The response of apricot trees to gradient on the Saligny State Farm.)** [English, French, Russian and German summaries ¾ p. each.]
*Grăd. Via Liv.*, 1958, **7**(9): 31-5, illus. + summaries.

Trees of the variety Best Hungarian, grafted on wild apricot, were contour planted on hillsides of various gradients, each tree being protected from erosion by a horse-shoe ridge. Growth and yield were found to be inversely proportional to the gradient, the nutrient and water content of the soil showing a similar trend. Optimum results were obtained on slopes with a S.E. aspect.

### *Nutrition and mineral composition.*

(*See also* 2077, 2129, 2186k, w, 2324.)

2133. Jonkers, H.
Vergelijking van ureum van Nederlandse en Engelse herkomst bij bladbespuiting in de fruitteelt. **(Comparison of urea from Dutch and English sources as foliar sprays in fruit growing.)**
*Fruitteelt*, 1959, **49**: 111.

At Geldermalsen no damage to 4 apple and 4 pear varieties followed 3 sprays of 0·4% urea, but at 0·7% urea both Conference and Comtesse de Paris showed a leaf damage, which was more severe with an English than with a Dutch product. Four concentrate sprays of 2·5% and 3·5% urea at Serooskerke applied to Conference produced slight leaf injury, especially with the English material; an increased biuret content did not, however, increase leaf damage. In a third trial at Wilhelminadorp five sprays of 0·5% urea applied to 2 pear varieties caused only slight damage to Conference trees, which had already been treated with the Dutch product.

2134. Kumashiro, K., and Okamura, K.
**Fertilizer effects of slag on fruit trees growing in volcanic-ash soil. (I) Comparison of fertilizer effects of ground limestone and slag on growth of young trees of apple, grape and Japanese pear.** [Japanese, with English summary ¼ p.]
*J. hort. Ass. Japan*, 1958, **27**: 265-70, bibl. 10, illus.

Both slag and limestone promoted the growth of young apple, grape and Japanese pear plants growing in pots containing volcanic ash soil. Differences between the 2 fertilizers were not marked with pear, but with apples and grapes the effect of slag was the more striking. Leaf contents of N decreased with increasing applications of slag. Increasing dressings of slag and limestone resulted in a slight increase in leaf P contents. Contents of Ca, Mg and $SiO_2$ were closely related to the amounts applied of limestone (especially the Ca) and slag (especially the Mg and $SiO_2$). Growth of apple trees was closely correlated with leaf contents of Mg and $SiO_2$.

2135. Dilley, D. R., and others.
**Growth and nutrient absorption of apple, cherry, peach, and grape plants as influenced by various levels of chloride and sulfate.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 64-73, bibl. 15, illus.

Increasing the supply of chloride (to 665 p.p.m.) decreased growth of all the test crops and produced leaf symptoms of chloride toxicity in peach. Increasing sulphate levels did not affect the growth of apple, peach and grape adversely, but depressed the growth of cherry trees. A combined application of sulphate and chloride decreased growth in proportion to the chloride level. The chloride content of cherry leaves and grape petioles was directly proportional to the supply. Peach and apple leaves had approximately the same chloride content at 315 and 665 p.p.m. levels of chloride supply. Chloride absorption by all crops was reduced with increasing sulphate supply. The sulphur content in all plants increased with supply, but with an additional high chloride supply sulphate absorption was reduced. Chloride and sulphate treatments did not affect the N, P, Fe, Cu and Zn contents of any crop. Increasing chloride levels resulted in increased Mn and decreased K in cherry, apple and peach, in decreased Ca in cherry and peach, in decreased Mg in peach and grape and in decreased B in cherry leaves. Increasing sulphate levels in the solution increased B in cherry, apple and peach leaves; high sulphate levels reduced Ca in cherry and peach leaves. The relatively low or high contents of certain elements induced by chloride or sulphate applications appeared to be neither inadequate nor toxic for growth.—Mich. St. Univ., E. Lansing.

2136. Yamazaki, T., and Mori, H.
**The absorption of essential nutrient elements by apple trees in water culture. (III) Absorption of nitrogen, phosphorus, potassium, calcium and magnesium during the dormant period.** [Japanese, with English summary ¼ p.]
*J. hort. Ass. Japan*, 1956, **27**: 271-5, bibl. 11, illus.

Uptake of N and P by young apple trees was very low during the winter, but an appreciable amount of K was discharged by the roots between late November and the end of March. The amounts of N and P absorbed per unit of weight during dormancy decreased as the trees became older. No K and Ca were absorbed during this period, and the amounts of Mg absorbed were small. [For part II see *H.A.*, 28: 2197.]

2137. Mason, A. C., and Whitfield, A. B.
**A progress report on the mineral composition of leaves from selected apple orchards in the Eastern Counties of England.**
*A.R. E. Malling Res. Stat. 1958*, 1959, **A42**: 86-8, bibl. 5.

In mid-July, 1957, three types of leaf sample were collected in 31 orchards, 9 of which were clean cultivated and 22 grassed. All the trees were Cox's Orange Pippin on M.II rootstock and were about 20 years old. Orchards giving relatively high and low yields and producing fruit of good and poor keeping quality were represented. Types of leaf sample were : (i) the youngest fully grown leaf on extension shoots, (ii) the middle leaves from similar shoots (the type commonly used for analysis) and (iii) the largest rosette leaf from a non-fruiting spur. The lowest, highest and mean N, P, K, Ca and Mg contents found in each type of leaf sample are tabulated, and the mean contents found are compared with mean values reported for similar foliar analysis surveys carried out in Japan and the U.S.A. The present survey will have to be continued for some years before conclusions can be drawn.

2138. Bielińska, M., and Włodek, L.
Zawartość fosforu, potasu i wapnia w liściach i pędach jabłoni owocujących przemiennie. (**Contents of phosphorus, potassium and calcium in leaves and shoots of biennial bearing apple trees.**) [Russian and English summaries 1 p. each.]
*Prace Inst. Sadown. Skierniewice*, 1958, **3**: 5-29, bibl. 26.

Biennially-bearing apple trees showed decreased contents of leaf P and K and increased Ca during the growing season. Leaves in the on-year contained significantly more P, and generally contained less K and more Ca, than in the off-year. Contents of P in 1-year-old shoots and spurs showed a general increase from the summer until the spring. Potassium was at a minimum in winter, when the Ca content of the 1-year-old shoots was at a maximum. No relationship was found between the Ca content of fruit spurs and the time of sampling. The ash content was higher in fruiting spurs than in 1-year-old shoots; this difference was smallest for K and greatest for Ca. Spur contents of P were significantly greater in an on-year than in an off-year. Contents of K in 1-year-old shoots were lower, and Ca contents tended to be higher, in the on-year. [For earlier work see *H.A.*, 28: 151.]

2139. Pastýrik, L., and Priehradný, S.
**Seasonal changes of relation of some mineral nutrients in xylem and phloem of apple and pear trees.**
Reprinted from *Studies Plant Physiol., Prague*, 1958, pp. 123-31, bibl. 13.

P, K and Ca were estimated in the phloem and xylem of 1- to 3-year-old branches of 8- to 10-year-old apple and pear trees, samples being taken on 12 May and 18 September from 4 varieties of each. For each element the concentrations were expressed as a ratio, phloem/xylem. While these ratios showed appreciable specific and varietal differences, the overall picture was of a striking increase in the ratio in respect of Ca between the two sampling dates, and an appreciable increase in the ratio for K. The ratio for P increased in apples and decreased in pears from May to September.—Comenius Univ., Bratislava.

2140. Harley, C. P., Regeimbal, L. O., and Moon, H. H.
**The role of nitrogen reserves in new growth of apple and the transport of $P^{32}$ from roots to leaves during early-spring growth.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 57-63, bibl. 7.

Using a technique of multiple bark ringing, it was shown that the early-spring growth of apple trees was dependent primarily on nutrients stored in the above-ground structures. The amount of new growth was positively correlated with the amount of N in a given weight of reserve or storage tissue. New shoots from unringed parts of a branch made less growth and generally contained less N than those from segments with relatively large reserves. The total N content of new growths plus old reserve tissue was higher than that of reserve tissues at the time of ringing. Translocation of $P^{32}$ from the roots of dwarf apple trees in sand culture to developing buds was not detected, and no $P^{32}$ was detected in the leaves until they were at least 1 sq. cm. in area. The accumulation of $P^{32}$ increased with leaf development. The supply of $P^{32}$ to the leaves was cut by 92% when branches were ringed.—U.S.D.A., Beltsville, Md.

2141. O'Grady, L. J.
Influence des éléments mineurs (fer et manganèse) dans les sols à vergers. **(Action of minor elements (iron and manganese) in orchard soils.)**
*Rapp. Minist. Agric. Québec, 1956-57*, 1958, pp. 15-16.

The effects of liberal applications of Fe and Mn on McIntosh apple production on an alkaline soil were studied for 4 years. Foliar application of Fe increased leaf Fe contents but did not influence yields; soil application affected neither leaf Fe, quality nor yield. Soil applied Mn also affected neither leaves nor yield; foliar applied Mn increased leaf Mn contents without influencing yield. Foliar applied Mn also increased the vitamin C content of the fruit from a mean 3·8 mg. of ascorbic acid per 100 g. fruit to 4·4 mg. Manganese deficiency symptoms were not seen when the leaf content reached 14 p.p.m. or more of total Mn, but the chemical form in which the Mn is present proved more important than total content. Two sprays of Mn 10 days apart removed symptoms of Mn deficiency.—Inst. agric. d'Oka, La Trappe.

2142. Kessler, B.
**Further evidence on the effect of bicarbonate ions upon nucleic acid metabolism and ion uptake in fruit trees susceptible and non-susceptible to lime-induced chlorosis.**
*Ktavim*, 1958, **8**: 287-93, bibl. 13.

The effects of bicarbonate ions upon the uptake of calcium, the concentration of ribonucleic acid at the root surface and the activity of ribonuclease in fruit trees were tested. Inverse relations were found to occur between the concentration of bicarbonate, and the uptake of calcium and ribonucleic acid localized at the root surface. Direct relations were found between the concentration of bicarbonate ions and the activity of ribonuclease in roots. Apricot trees, being susceptible to lime-induced chlorosis, were more severely affected by bicarbonate than the more resistant almond species. The possible part played by nucleic acids and their enzymes in the uptake of ions is discussed. [Author's summary.]

2143. Riddell, R. T.
**Yield responses in Bartlett pears. I. Gross response. II. Morphologic variations affecting yield. III. A commercial application.**
*Bett. Crops*, 1958, **42** (9): 34-45, illus.

The responses of leaves of low-yielding pear orchards to fertilizers only became apparent after the second application, and also varied with growing conditions. Levels of leaf P were not affected by P applications, but potash increased leaf K up to a maximum of 1·51%. Straw mulch alone was more effective than a low fertilizer rate (10 lb. of 10–10–10 per tree) in raising leaf K; straw plus low NPK induced leaf nutrient responses equal to those of high NPK (30 lb. per tree). Profits from adding fertilizer were highest where the most fertilizer was used. No single morphological character was found to be an infallible indicator of potential yield, but pollen germination, spur diameter and leaf shape could be used in evaluating possible yields. Pollen germination percentage responded rapidly to applied fertilizer. Shoot and spur leaves from high-yielding trees were flat with large, blunt apices and were larger than those from low-yielding trees. A uniformly high level of fruit set was found to be necessary for maximum yields under orchard conditions; treatments containing P and K produced the highest fruit set, but many fruits did not develop to marketable size at maturity. High NK and NPK treatments reduced the June, and subsequent, drop almost to nil. With low leaf K applications of N did not affect fruit size, but with leaf K above 1% N applications increased fruit size. In a commercial trial an application of 1,500 lb. of 10–10–10 per acre yielded a profit of $340 three years after the fertilizer treatment had started. Fire-blight infections were suppressed, but there was a build-up of pear psylla and apple maggot in high-yielding trees.—Ont. agric. Coll., Guelph.

### *Physiology and biochemistry.*

(*See also* 2092p, 2117, 2120, 2124, 2183.)

2144. Barskaja, E. I., and Oknina, E. Z.
**Nucleic acids in the formation and growth of seeds of fruit crops.** [Russian.]
*Fiziol. Rast.*, 1959, **6**: 98-9, bibl. 16.

Experimental proof was obtained in cherries and apples of the existence of a high level of nucleic acids in the early stages of formation and growth of seeds, i.e. when the rate of mitosis was greatest. At the end of growth the nucleic acid content, especially that of RNA, fell considerably, and, when the embryo entered into the dormant phase, the content of DNA was very low and that of RNA practically nil. Small quantities of both, however, were retained in the growing points, procambium and dermatogen. This reserve in the dormant cells is regarded as essential for the resumption of growth during germination.

2145. Abramov, N. A.
**Causes of dormancy in the seeds of fruit plants.** [Russian.]
*Tr. Plodoovočšn. In.-ta im. I.V. Mičurina*, 1956, **9**: 111-27, from *Ref. Ž.* (*Biol.*), 1958, No. 5, Abstr, 20,467.

The structure of apple, pear, apricot, and other fruit seeds was studied in relation to the length of their dormancy. It was found that the dormant period can vary in relation to the permeability to gases of the outer and inner membranes and lipoidal layer of the protoplasm, the content and localization of fats and proteins in the tissues of cotyledons, and the chemical activity of the storage fats and lipase. The length of dormancy is in direct relation to the rate of saturation of fatty acids, its duration being reduced by an increase in the iodine number of the fat. The main causes of dormancy in fruit seeds appear to be mechanisms that limit the respiration of the embryo as a whole and of its individual cells.

2146. Kawase, M.
**The after-ripening of dormant apple seeds in relation to auxin content.**
*J. hort. Ass. Japan*, 1958, **27**: 256-64, bibl. 22.

Maximum germination of Jonathan seeds was obtained after 35-days stratification of excised embryos and after 77-days stratification of intact seeds. The content of an unidentified, acid, growth-promoting substance in the embryo increased rapidly during stratification. The content of a growth-promoting substance in the endosperm also increased during stratification. Seed coats contained a strong growth-inhibiting substance and a growth-promoting substance, and during stratification the content of the inhibitor decreased and that of the promotor increased.

2147. Flemion, F.
**Effect of temperature, light and gibberellic acid on stem elongation and leaf development in physiologically dwarfed seedlings of peach and *Rhodotypos*.**
*Contr. Boyce Thompson Inst.*, 1959, **20**: 57-70, bibl. 20, illus.

Experiments are described in which supplementary light served to some extent as a substitute for the chilling requirements of seeds by overcoming the inability of physiological dwarfs to elongate. Nevertheless the lack of chilling still caused a tendency to produce misshapen leaves on the main axis resembling those of dwarfed seedlings from unchilled seeds grown under daylight conditions in the greenhouse. GA treatment combined with supplementary light overcame the etiolation effects produced by either short photoperiods or GA applications alone. Apical buds of dormant peach seedlings often resumed growth without chilling, when placed under supplementary light but not in constant darkness. Excluding light from the tips of active seedlings caused extreme etiolation, and, on subsequent exposure to daylight, no further elongation occurred but whorls of leaves developed at the tips.

2148. CROWE, A. D.
**Growth substances in the flower and developing fruitlet of the apple during the immediate post-blossom period: an investigation into the causal mechanism of fruit set in the apple.**
*Diss. Abstr.*, 1959, **19**: 1880, being *L.C. Card No. Mic.* 59-437 of 192 pp.

Three major growth substances (believed to be identical with Luckwill's *Malus* auxins 2 and 3 and *Malus* inhibitor 2 [see *H.A.*, 27: 1159]) were found in the apple flower at anthesis and during the period of initiation of fruit growth. Initially there was no measureable difference between auxin amounts extracted from pollinated and non-pollinated fruitlets. The content of inhibitor 2 was slightly higher in non-pollinated fruitlets. With many varieties no relationship could be demonstrated between auxin amounts and differences in fruit set. Diffusates from the pedicels of developing fruitlets were much more active than those from non-developing fruitlets; this was largely due to the presence of *Malus* auxin 2. It is considered that the growth substances measured did not cause fruit development, and that measurements of auxin content bear little relationship to the role of auxin in the tissue under study. It is suggested that after syngamy a factor (X) is produced by the fertilized ovule, and this controls fruit development.—Cornell Univ.

2149. HILLIS, W. E., AND SWAIN, T.
**The phenolic constituents of *Prunus domestica*. II. The analysis of tissues of the Victoria plum tree.**
*J. Sci. Food Agric.*, 1959, **10**: 135-44, bibl. 12.

The tissues of the Victoria plum tree were analysed for total phenols, *leuco*-anthocyanins and flavanols at intervals during the growing season. At all times, the methanol extracts from the smaller leaves contained smaller amounts of phenolic constituents, although the changes paralleled those in the larger leaves. The proportions of *leuco*-anthocyanins and flavanols to total phenols were less in the smaller leaves. The amounts of the three phenolic constituents increased rapidly until the leaves reached maximum size and then decreased. Leaves taken from the shady side of the tree contained less phenolic constituents and a lower proportion of *leuco*-anthocyanins. The analysis of shaded leaves suggested that the synthesis and metabolism of *leuco*-anthocyanins were influenced by light. Leaves from unhealthy trees contained smaller amounts of phenolic constituents and the *leuco*-anthocyanins were a much smaller fraction. The amount of the phenols in a plum fruit increased with its growth and the *leuco*-anthocyanins in the skin decreased when it reddened. The phenolic constituents in the woody tissues showed a much smaller variation than the leaves, and the outer bark, phloem and cambium contained more of them than the outer and inner sapwoods and the heartwood. [Authors' abstract. For part I, see *H.A.*, 29: 1176p.]—Low Temp. Res. Stat., Cambridge.

### *Pruning, training and defoliation.*

(*See also* 2104, 2803.)

2150. CARLONE, R.
La potatura delle forme libere. (**Pruning of free tree forms.**)
*Ital. agric.*, 1959, **96**: 127-42, illus.

Forms advocated for pears are the 2 types, tier and spiral, of pyramid. Vase forms for apple, pear, plum and apricot are described. Swiss systems adopted for apple, pear and cherry are discussed. In each case the course of pruning and training is described.

2151. MONIN, A.
Essai de taille sur pommiers greffés sur M.IX. (**A pruning trial with apple trees grafted on M.IX.**)
*Bull. hort. Liège*, 1959, **14**: 74-8.

Eight years' observations show that curves of production are almost identical for trees of the same variety regardless of the pruning system. Total yields, however, were affected by type of pruning, the highest yields being obtained from the spindle-bush and modified Oeschberg systems. Yields from open centre and dwarf pyramid forms were relatively low, which may be an effect of the severe pruning of young trees.—Stat. Rech. Amél. Plantes fruit. maraîch. Grand-Manil.

2152. TOORENAAR, G.
Problemen bij de snoei van Cox's Orange Pippin. (**Problems in pruning Cox's Orange Pippin.**)
*Fruitteelt*, 1959, **49**: 66-7, illus.

With 4-year-old trees on M.IX and 6-year-old trees on M.IV the percentage fruit set was higher in trees which had been hard pruned (into 2-year-old branches) than in lighter-pruned or unpruned trees. Proefst, Fruit., Wilhelminadorp.

2153. MAGGS, D. H.
**The effect of the original situation of the scion on its subsequent growth.**
*A.R. E. Malling Res. Stat. 1958*, 1959, **A42**: 83-5, bibl. 8.

The object of the experiment described here was to determine whether there was any inherent difference in growth potential between buds occupying different positions on a shoot, which could account quantitatively for pruning responses. Grafts, each consisting of 2 buds, were taken from 5 positions along layer-bed shoots of M.XVI and were worked on to uniform plants of the same rootstock variety growing in pots. Differences in the subsequent growth of the scion buds from the 5 positions were not so great as those which would be expected if the same buds had been stimulated into growth by pruning. Differences in the weight of shoots that had developed from the different buds by the end of September were related to differences in leaf area measured as early as the end of May.

2154. Dorgobužina, K. D.
**Some fruiting characteristics in the apricot.** [Russian.]
*Agrobiologija*, 1958, No. 4, pp. 57-62.

In the Crimea under favourable conditions a second growth period occurs in the apricot. Efforts are made to encourage this by pruning, because the flower buds on these shoots burst 5–10 days later than normal and thus escape frost injury. The highest percentage of fruit set on all shoots was obtained following spring pruning plus pinching back on 1 June or following summer pruning on 15 June. It was also found that fruit set was higher on second-growth shoots, especially those of medium vigour.

2155. Soczek, Z., and Mrozowski, M.
Wstępne obserwacje nad wpływem cięcia odmładzającego na owocowanie, długość przyrstów i przemarzanie starych czereśni. **(Preliminary observations on the influence of heavy pruning on yield, shoot growth and frost susceptibility of old sweet cherry trees.)** [Russian and English summaries ½ p. each.]
*Prace Inst. Sadown. Skierniewice*, 1958, **3**: 163-70, bibl. 9.

During a 3-year period yields from pruned trees were as much as 14% lower than those from non-pruned trees, although the weight of 100 fruits from pruned trees was 15% higher than that of fruit from non-pruned trees. New growth from pruned Natolinska cherries showed the largest average shoot length (18·7 cm.) in the second year.

2156. Brown, D. S., and Harris, R. W.
**Summer pruning trees of early maturing peach varieties.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 79-84, bibl. 3.

Summer pruning of 4 peach varieties, compared with pruning in the following winter, reduced flower-bud drop and resulted in an increased number of flowers per tree. Numbers and weights of fruits harvested per tree tended to be higher on summer-pruned trees. Fruit-size was smaller after summer pruning, but this was due in part to inadequate thinning. Flowering of summer-pruned trees was delayed only with Redhaven and with Merrill Beauty in one orchard. Shoot size (based on weight of shoot per unit length) was greater on summer-pruned trees. July pruning was generally more effective than August pruning in reducing bud drop and in increasing yields and shoot size. [For earlier work see *H.A.*, 28: 3359.]—Univ. Calif., Davis.

2157. Scaramuzzi, F.
Alcuni rilievi su una operazione di potatura estiva al pesco Fior di Maggio. **(Some observations on summer pruning of the peach variety Mayflower.)**
*Frutticoltura*, 1959, **21**: 21-4, bibl. 5, illus.

This variety, when grown in areas of mild winters, tends to suffer heavily from flower-bud drop. When the routine summer pruning was modified to include removal of the ends of branches, new early flowering shoots developed, with significantly lower flower-bud drop. Yield and quality of fruit were significantly higher than from uncut branches, and almost equal to those from spurs.

2158. Westwood, M. N., and Gerber, R. K.
**Seasonal light intensity and fruit quality factors as related to the method of pruning peach trees.**
*Proc. Amer. Soc. Hort. Sci.*, 1958, **72:** 85-91, bibl. 6.

Light intensity within trees pruned correctively (very little annual pruning) increased throughout the season. With harder annual pruning light intensity within the tree decreased as the season progressed; the decrease was greatest with the most severe pruning. Significantly more fruits were produced by the lighter-pruned trees, but fruit size on correctively-pruned trees was not commercially satisfactory. Fruit colour was inversely related to the severity of pruning. The most satisfactory method of pruning was thinning out, following which fruiting wood was renewed annually along the main scaffold branches.—Utah St. Univ., Logan.

2159. Scaramuzzi, F.
Un quinquennio di ricerche sull'epoca più opportuna per la potatura invernale di produzione del pesco. **(Five years' trials to determine the best time for winter pruning peaches.)**
*Ann. Sper. agrar.*, 1958, **12**: 1613-54, bibl. 33, illus.

Five years' trials on the pruning of numerous peach varieties in three districts of Italy at different times are here reported. The time of pruning varied from leaf fall till the first spring growth. In one series whole trees were pruned approximately on one date, in another only one-third of the tree was pruned on a given date and the other two-thirds, corresponding with the other two main branches, on other dates. Observations were made on (1) wound gum production, (2) bud drop, (3) bud opening, (4) productivity and (5) tree vigour. The general conclusions reached are discussed and amount to the fact that pruning is best undertaken as soon as possible once the heaviest winter frosts are over and should be finished before blossoming.

2160. Rakitin, Ju. V., and Imamaliev, A.
**Chemical defoliation of fruit trees.** [Russian, with English summary ⅓ p.]
*Fiziol. Rast.*, 1959, **6**: 61-6, bibl. 14.

Young-and bearing trees of apple, pear and cherry in the Moscow region were satisfactorily defoliated by 0·25–0·5% magnesium chlorate or 0·075–0·1% endothal, applied during the first half of September. The treatment accelerated the formation of the petiole abscission layer and shoot lignification, reduced transpiration and increased frost resistance. Growth and fruiting in the following year were not affected.

2161. Davies, M. H. E.
**Some trials of the effect of defoliation upon cropping of apples.**
*A.R. E. Malling Res. Stat. 1958*, 1959, **A42**:53-9, bibl. 8.

Hand defoliation of all expanded leaves of the apple variety Winter Sunshine approximately 40 days after full bloom reduced fruit bud formation, leaf area and shoot growth for the remainder of the season. Similar defoliation 10 days after full bloom did not depress fruit bud production significantly, and the effects on leaf area and shoot growth were less severe. There is a suggestion that the removal of the distal half of the leaf has a greater depressing effect upon fruit bud production and allows more shoot growth than the removal of the proximal half. Defoliation of Worcester Pearmain apple trees resulted in the dropping of the entire crop shortly after treatment; shoot growth and cropping were not affected in the year after treatment. [Author's summary.]

### *Fruit thinning and drop.*

(*See also* 2186t.)

2162. Ljones, B., and others.
Forsøk med kjemisk tynning av eple. **(Experiments on the chemical thinning of apples.)** [English summary 1¼ p.]
*Forskn. Landbruk.*, 1959, **10**: 1-31.

Elgetol, applied at blossoming, had a more reliable thinning effect than several hormone sprays used both at blossoming and on the young fruits. As a result of the Elgetol treatment the number of apples was reduced by 29–54%, while fruit size increased by 23–46%. However, some risk of injury was involved, especially when spraying was followed by cold and rainy weather. NAA or its amide reduced June drop in James Grieves. There is some hope that a way will be found of controlling the biennial bearing habit of Gravenstein by means of fruit thinning.—Agric. Coll. Norway.

2163. Liard, O.
L'éclaircissage des fleurs ou fruits du pommier. **(Fruit or flower thinning on apple trees.)**
*Bull. hort. Liège*, 1959, **14**: 104-10, bibl. 20.

The author's results with organic dyes and with NAA are discussed and compared with those of foreign workers. The action of NAA, although affected by many variables, can contribute successfully to the production of quality fruit. [See also *H.A.*, 28: 3356.]

2164. Friedrichs, W.
Essais d'éclaircissage chimique de la variété de pomme Golden Delicious. **(Tests on chemical thinning of Golden Delicious apples.)**
*Rev. hort. suisse*, 1959, **32**: 83-5, illus.

Dirigeol (based on NAA) applied at 8·28 g. per 200 l. to 12-year-old trees at 70–90% petal fall resulted in a satisfactory degree of thinning, and at harvest the fruits weighed 150–250 g. At 11 g. per 200 l. thinning was too severe and there was some leaf injury.

2165. Batjer, L. P., and Westwood, M. N.
**Size of Elberta and J. H. Hale peaches during the thinning period as related to size at harvest.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 102-5, bibl. 3.

Fourteen days after the start of pit hardening was chosen as a reference date, to which harvest size could be related in thinning studies. Size at the reference date for both Elberta and J. H. Hale was shown to be consistently and significantly related to harvest size.—U.S.D.A., and Wash. St. Coll., Wenatchee.

2166. Marth, P. C., Audia, W. V., and Mitchell, J. W.
**Evaluation of chlorine-substituted phenoxyacetic acids and amides for retarding abscission of apple fruits.**
*J. agric. Food Chem.*, 1959, **7**: 122-4, bibl. 15, illus.

The amide forms of chlorine-substituted phenoxyacetic plant regulators were more effective in retarding mature fruit abscission than the corresponding acids. When chlorine was substituted in all possible combinations of mono-, di-, tri-, tetra- and penta- positions on the benzene nucleus, in all instances where the 6 position contained chlorine the compound was rated as relatively inactive. To a lesser degree chlorine substitution in the 3 position also reduced the effectiveness of a compound. The 17 acids and 17 amides were compared directly on three varieties of mature apple fruits; the complete series of 17 amides was applied to six varieties. [Authors' abstract.]—U.S.D.A., Beltsville, Md.

### *Fruit composition and quality.*

(*See also* 2092i, 2141, 2186c, 2187f, 2437.)

2167. Dickinson, D.
**Relationship of chemical composition to quality in fruit and vegetables for canning.**
*J. Sci. Food Agric.*, 1959, **10**: 73-8, bibl. 20.

The author reviews the factors which affect quality including sugar and acid contents. Changes during storage in cans are also considered including the effect of heat resisting enzymes in the stones of certain fruits. Hydrogen swell tests have shown that the rootstock used for plums, as well as the variety, influenced enzyme heat resistance, myrobalan stocks enhancing enzyme activity. Other effects of enzyme activity in canned fruits and vegetables are also discussed.—Fruit. Veg. Canning Quick Freez. Res. Ass., Chipping Campden.

2168. Lopez, A., and others.
**Composition of ten processing and table varieties of Virginia apples.**
*Food Res.*, 1958, **23**: 492-504, bibl. 36, from abstr. in *J. Sci. Food Agric.*, 1959, **10**: i-96.

Ten varieties of peeled and cored Virginia apples grown in several locations were examined for firmness, specific gravity of juice, total acidity, pH, soluble solids, soluble solids-acid ratio, reducing and total sugars, sucrose, pectin, tannin and ash. Significant differences were found both within and among varieties. Total acidity decreased with loss in firmness; pH and the soluble solids-acid ratio increased. In general, soluble solids, total sugar and reducing sugars decreased slightly with a decrease in firmness. Quality for processing is best assessed by using data on firmness, together with soluble solids and acidity and astringency values if known.

2169. Rootsi, N.
Några bedömningsgrunder för fruktkvalitet hos äpple. (**The assessment of fruit quality in apples.**) [German summary, 1½ p.]
*Sver. pomol. Fören. Årsskr. 1958*, 1959, **59**: 139-47, bibl. 7.

Points considered are: losses due to peeling and cutting out the core, particularly of ascorbic acid; dry matter content: specific gravity; the content of air and water, for the determination of which a new method is proposed.—Alnarp.

2170. Huelin, F. E.
**Studies in the natural coating of apples. IV. The nature of cutin.**
*Aust. J. biol. Sci.*, 1959, **12**: 175-80, bibl. 13, illus.

Cutin purified with snail gut extract yielded, on alkaline hydrolysis, ether-soluble acids, a water-soluble fraction containing carbohydrates, and an insoluble fraction containing protein. A number of sugars and amino acids were identified in the acid hydrolysates of the last two fractions. No evidence of continuing polymerization of the cutin during storage was obtained. It is suggested that cutin is a polyestolide of hydroxy acids and other substances. Possible modes of formation are discussed. [Author's summary. For Parts I–III see *H.A.*, 22: 2230, 2231, and 27: 1157.]—C.S.I.R.O., Homebush, N.S.W.

2171. Ryugo, K., and Davis, L. D.
**Seasonal changes in acid content of fruits and leaves of selected peach and nectarine clones.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 106-12, bibl. 5.

In all of the selected clones the acid contents of fruits increased to a maximum and then decreased as the fruits approached harvest maturity. The acid content at harvest was positively correlated with that at the maximum. Varieties with a low acid content reached their maximum relatively earlier in the season than those with a higher acid content. There were no marked differences in seasonal total acid contents of leaves among the varieties, although the acid content tended to diminish with time, when expressed on a fresh weight basis. The data did not indicate any relationship between the acid contents of leaves and fruits.—Univ. Calif., Davis.

2172. Sterling, C.
**Effect of temperature and bruising on sugar and acid content in free-stone peaches.**
*Food Res.*, 1958, **23**: 380-3, bibl. 17, from abstr. in *J. Sci. Food Agric.*, 1959, **10**: i-96.

In bruised and unbruised free-stone peaches held at different temperatures for 20 hours, the moisture and free acid contents decreased with increasing temperature but the sugar content remained fairly constant. The maximum difference in free acid content between bruised and unbruised fruit probably occurs in the 70–95° F. range. The acid content of bruised peaches is equal to that of unbruised at 34° F. and again at 130° F.

2173. Tomaszewska, E., and Tomaszewski, M.
Chemiczna i fizykochemiczna charakterystyka owoców kilkunastu odmian śliw i moreli. (**Results of chemical and physico-chemical analyses of the fruits of certain varieties of plum and apricot.**) [English summary 11 lines.]
*Arbor. Kórnickie, 1957-58*, 1958, **3**:247-56, bibl. 13.

The physical and chemical characteristics of the fruits of 11 plum and 4 apricot varieties are given. Vitamin C was highest in De Soto plum, averaging 39·0 mg. %. [For earlier work see *H.A.*, 28: 158.]

### *Harvesting, transport and storage.*

(*See also* 2092r, 2095, 2170, 2172, 2186a, e, n, p–s, 2187b, 2189, 2291, 2357, 2366a.)

2174. Herrick, J. F. Jr.
**Handling and storage of apples in pallet boxes.**
*Agric. Mktg*, 1958, **3**(12): 14, illus.

Lined boxes, 24 in. deep, carried fruit with less bruising than 27- or 32-in. boxes, but 34-in. unlined boxes with 10-in. removable sides were almost as good as 24-in. boxes as the removable sides enabled pickers to empty their bags more gently. Boxes with ¾-in. spaces between the boards gave better protection than boxes with solid sides. Apples in some types of pallet box cooled more rapidly than those stored in standard boxes on pallets. The use of pallet boxes can save a grower-packing house operator $70–85 per 1,000 standard box equivalents.

2175. Ginsburg, L.
**Eleventh Annual Conference (November, 1958) dealing with problems related to the storage and transport of deciduous fruit.**
*Dec. Fruit Gr*, 1959, **9**: 9-18, illus.

Problems discussed at the Conference and in this paper include the following:—*Grapes:* the polythene liner pack; the development of a metabisulphite treated paper to emit $SO_2$ gradually under conditions of high humidity. *Peaches:* the effect of picking maturity on quality. *Apples:* the effect of pre-storage treatment on keeping quality. *Pears:* hydrocooling prior to canning. The effect of pre-cooling apricots, plums and peaches at 25° F. instead of 31° F. is under investigation. The use of an insulated blanket made of light resin bonded glass fibre shows promise for preserving cool temperatures.

2176. Louis, P. J.
Emballage at pré-emballage des fruits et des légumes. **(Packs and prepacks for fruits and vegetables.)**
*Arboric. fruit.*, 1959, No. 60, pp. 22-6, illus.

The Institut Français de l'Emballage et du Conditionnement, 3, rue de la Boétie, Paris-8ᵉ, set up in 1955 a yearly packing competition, "Concours des Oscars de l'Emballage", to encourage better packing with an eye to the introduction and use of satisfactory prepacks for fruit and vegetables. Here are illustrated with descriptions 7 very varied, but all attractive, prepacks, 4 larger containers to take prepacks and certain other light containers. The institute offers to send further information on the subject to those who apply for it.

2177. Padfield, C. S.
**Progressive reduction of storage temperature for apples.**
*N.Z. J. agric. Res.*, 1959, **2**: 165-8, bibl. 2.

Experiments were conducted over 2 seasons with the varieties Ballarat, Jonathan and Sturmer on the lines of the Australian practice of storing initially at 38° F. for 6 weeks and reducing the temperature by stages to 32° F. The high incidence of breakdown, core-flush and scald showed that this method had no advantage over the present New Zealand practice of maintaining a steady storage temperature of 37–38° F.—D.S.I.R., Havelock North, N.Z. M.C.S.

2178. Smith, W. H.
**Control of superficial scald in stored apples.**
*Nature*, 1959, **183**: 760, bibl. 3.

Bramley's Seedling apples were stored at 0° C. and samples taken at intervals from 0 to 30 weeks. The samples were kept at 15·5° C. for 5 days after removal from cold storage. There was a progressive reduction in the percentage of apples with scald and a diminution of severity with warming from the 2nd to 12th week and a complete absence of scald when the apples were warmed in the 16th and 20th weeks. In the 30th week scald again became very marked. The implications of these findings as regards the cause and possible means of control of scald are discussed.

2179. Fisher, D. V.
**Controlled atmosphere storage of McIntosh in British Columbia.**
*Proc. 54th annu. Mtg. Wash. St. hort. Ass. 1958*, Yakima, pp. 51-6.

Gas storing McIntosh at 35° F. and in atmospheres of 5%+3% or 7%+14% $CO_2$ and $O_2$ respectively has eliminated the development of core flush and allowed the sale of McIntosh apples in April at a considerably higher price than that got in the normal season, viz. September to January.

2180. Nyhlén, Å., and Castberg, C.
Korttidslagring av äpple i polyetenpåsar. **(Short-term storage of apples in polythene bags.)** [English summary ¾ p.]
*Sver. pomol. Fören. Årsskr. 1958*, 1959, **59**: 121-37, bibl. 7.

In two years' trials perforated polythene bags proved preferable to wooden or corrugated fibre boxes for short-term (11–25 days) storage in spite of higher losses from rots and internal disorders associated with the plastic bags.

2181. Ostrowski, W., Rzepecka, I., and Gdowski, J.
Kolejowy transport czereśni z zastosowaniem lodu naturalnego i suchego. **(Transport of sweet cherries in freight cars cooled with natural and dry ice.)** [Russian and English summaries 1 p. each.]
*Prace Inst. Sadown. Skierniewice*, 1958, **3**: 101-29, bibl. 11.

Transport was most satisfactory in an insulated car cooled with natural and dry ice, when 15% of the fruits showed rots. Rots increased to 24% when only natural ice was used for cooling. Fruit rotting also increased as the capacity of the crates increased, and rotting was further increased by paper linings. Losses in fruit weights during refrigerated transport varied from 1·05% to 3·22%. An extension in the transport period from 3 to 5 days also increased the rotting percentage.

2182. Singh, U. P.
**Artificial ripening of loquat (*Eriobotrya japonica* Lindl.).**
*Sci. and Cult.*, 1959, **24**: 335-7, bibl. 1.

Fruits in 2 stages of ripening were stored in 3 ways, viz. in wheat straw in cardboard boxes, in finely perforated sealed polythene bags and under normal conditions. Changes in appearance and composition were recorded. Only lemon-yellow fruit could be artificially ripened; cyprus-green fruit failed to ripen. Considerable desiccation occurred in the fruit in wheat straw. The polythene bags retarded transpiration but appeared to cause adverse chemical changes.

2183. Boldor, O.
Experienţe pentru grabirea coacerii piersicilor şi prunelor cu etilen şi stiren. (**Experiments on hastening maturity in peach and plum fruits with ethylene and styrol.**) [Russian and French summaries.]
*An. Univ. "C. I. Parhon", Ser. stiint. natur.*, 1956, No. 11, pp. 207-21, from *Ref. Ž.* (*Biol.*), 1958, No. 2, Abstr. 5, 602.

Peaches were treated with ethylene and styrol for 5 days and plums for 6 days. Determinations were made on the intensity of respiration, changes in the respiratory coefficient and fruit colour; in peaches the dynamics of the mono- and disaccharides and titrable acidity were also studied. Ethylene treatment increased the intensity of respiration and the respiratory coefficient in both fruits, and in peaches it increased the content of monosaccharides while decreasing that of disaccharides. The optimum concentration of ethylene for plums was 0·5%, and for peaches 0·2%. Styrol advanced ripening, but at concentrations above 1·8 mg./l. it imparted an unpleasant odour to the fruit.

2184. Gordon, H. T., Thornburg, W. W., and Werum, L. N.
**Hydroxyethyl derivatives in prunes fumigated with $C^{14}$-ethylene oxide.**
*J. agric. Food Chem.*, 1959, **7**: 196-200, bibl. 19.

Dried prunes fumigated with ethylene oxide-$C^{14}$ react with the fumigant to give non-volatile and relatively non-toxic alkylation products. Over 50% of the total radioactivity is combined as insoluble hydroxyethyl cellulose in the prune skin, 30% as hydroxyethylated sugars in the pulp, and 3% as glycols (mostly diethylene glycol). The remainder has been tentatively identified as hydroxyethylated amino acids and proteins. [Authors' summary.]—Univ. Calif., Berkeley, and Calif. Packing Corp., Emeryville.

2185. Lloyd, A. J., and Preston, I. W.
**Preservation of fruit and other products.**
*Brit. Patent* **783,194**, 31.12.54, from abstr. in *J. Sci. Food Agric.*, 1959, **10**: i-157.

Diphenyl is dispersed (20–30%) in aqueous medium in presence of a water-soluble salt of a polymeric carboxy- or hydroxy- compound (e.g. carboxymethylcellulose, polymer or copolymer of acrylic acid or methacrylic acid, styrene-maleic anhydride copolymer, or polyvinyl alcohol) and a protective colloid (aqueous dispersion of polystyrene), to give a stable dispersion (particle size 0·0001–0·004 in.). The dispersion is applied to paper, to provide a wrapping material suitable for use in preservation of fruit, etc.—Monsanto Chemicals, Ltd.

### *Noted.*

2186.

a Anon.
**Mechanizing small tree-fruit harvest.**
*Agric. Res. Wash.*, 1959, **7**(8): 10, illus.
A catcher-conveyor for use with a mechanical tree shaker [see also *H.A.*, 28: 3384.]

b Baldassari, T.
Impianto del frutteto industriale. (**Planting a commercial orchard.**)
*Frutticoltura*, 1959, **21**: 25-30, illus.
Methods for deciduous fruits in Italy.

c Beech, F. W.
**The yeast flora of apple juices and ciders.**
*J. appl. Bact.*, 1958, **21**: 257-66, bibl. 47.
Including a list of yeasts isolated from the fruit.

d Blaas, H. J.
Een nieuw plantsysteem. (**A new planting system.**)
*Fruitteelt*, 1959, **49**: 91-3, illus.
Planting in staggered double rows without reducing tree number per acre.

e Cavazzutti, B.
La raccolta di massa della frutta all'estero. (**Bulk harvesting of fruit in other countries [than Italy].**)
*Ital. agric.*, 1959, **96**: 121-6, bibl. 1, illus.
A summary of this Bureau's *Digest* No. 1 and possibilities of adopting bulk methods in Italy.

f Červenka, V. J. B.
Příspěvek k poznání včelníku multánského (*Dracocephalum moldavicum* L.) (**A contribution to the knowledge of *Dracocephalum moldavicum* L.**) [German summary 6 lines.]
*Preslia*, 1959, **31**: 179-80.
Valuable for bees and as a green manure crop for orchards.

g Comité Nationale pour l'Étude de la Culture Fruitière, I.R.S.I.A.
*Rapport général Déc. 1956—Déc. 1958.* (**General report of the [Belgian] National Committee for the Study of Fruit Growing, Dec., 1956, to Dec., 1958**), 1959, pp. 107+xxii.
Continuation of work reported in *H.A.*, 28: 2149.

h Congdon, N. B., and Woodhead, C. E.
**Cropping of the Winter Nelis pear in Hawke's Bay.**
*Orchard. N.Z.*, 1959, **32**(2): 34-7, illus.
Poor crops due primarily to lack of pollinators; Beurré Bosc and Williams' recommended.

i Fogle, H. W., and others.
**Earliril and Blenril apricots. Two new varieties for the Pacific Northwest.**
*Bull. Wash. St. agric. Exp. Stats.* **586**, 1958, pp. 7, illus.
See also *H.A.*, 28: 3400b.

j Friesdorf/Bad Godesberg.
Ermittlungen über den Anbauwert von Neuzüchtungen aus der Apfelsorte Cox Orangen Renette. (**Ascertaining the cultural value of new apple varieties derived from Cox's Orange Pippin.**)
*TätigkBer. gärtn. Versuchsanst. Friesdorf, 1957*, **29**: 5-34, illus.
Fifteen varieties described.

k Fritzsche, R.
Einige Hinweise zur Obstbaumdüngung. (**Some hints on manuring fruit trees.**)
*Schweiz. Z. Obst-u. Weinb.*, 1959, **68**: 105-11, illus.
Methods as practised at Wädenswil.

l Gilmer, R. M., and Einset, J.
**Some bud mutations of apple with virus-like symptoms.**
*Plant Dis. Reptr.*, 1959, **43**: 264-9, bibl. 10, illus.
Six fruit abnormalities which might be mistaken for virus symptoms.

m Grković, L.
Prilog ispitivanju vrednosti plodova drena kao sirovine za preradu u pekmez. (**The value of cornel fruit [*Cornus sanguinea*] used for jam.**) [English summary ½ p.]
*Arh. poljopr. Nauk.*, 1958, **11**: 133-7, vibl. 3.
Composition of wild fruit shows promise for jam-making.

n Hunter, D. L., Kafer, F., and Meyer, C. H.
**Apple sorting methods and equipment.**
*Mktg Res. Rep. U.S. Dep. Agric.* **230**, 1958, pp. 24, illus.
Studies of sorting tables, including the design, advantages and cost of a new and superior type.

o Krümmel, H.
Zur Sortenklärung bei den Sauerkirschen. (**On the precise determination of sour cherry varieties.**)
*Dtsch. Gartenb.*, 1959, **6**: 83-5, illus.
Concerning the varieties Königliche Amarelle, Diemizter Amarelle, Ludwigs Frühe and Werdersche Glaskirche.

p Lecrenier, —
La recherche scientifique dans la conservation des fruits et des légumes. (**Scientific research on the preservation of fruits and vegetables.**)
*Rev. Agric. Brux.*, 1958, **11**: 1177-97, bibl. 21.
A review; physiological considerations, cold storage and gas storage.

q Lyon, F. D.
**Vexed grower ends hauling problem.**
*West. Fruit Gr*, 1959, **13**(1): 19, illus.
An articulated, jeep-drawn semi-trailer designed to carry 3 pallet boxes.

r Marino, A.
I frigoriferi rurali. (**Rural cold stores.**)
*Frutticoltura*, 1959, **21**: 41-51, illus.
Plans for buildings of capacities 120, 300, 500 and 700 quintals [1 quintal=100 kg.].

s Melville, F., and Bloomfield, J. S.
**A guide to the harvesting of plums for export. Part 2.**
*J. Agric. W. Aust.*, 1958, **7**: 653-4, illus.
Coloured illustrations of 8 stages of maturity of Santa Rosa plums [for part 1, see *H.A.*, 28: 2238u.].

t Mitchell, A. E.
**Are you using a money making spray?**
*Amer. Fruit Gr*, 1959, **79**(4): 9, 51, 53, illus.
Methods of chemical thinning used by Michigan growers on apples.

u Nilsson, F.
Persikeodling. (**Peach growing [in Sweden].**)
*Sver. pomol. Fören. Årsskr. 1958*, 1959, **59**: 67-72, illus.
Including suitable varieties.

v Nybom, N.
Vad fordras av en modern äpplesort? (**What is demanded of a modern apple variety?**)
*Sver. pomol. Fören. Årsskr. 1958*, 1959, **59**: 91-108, illus.
A review, based on Balsgård experience.

w Plass, F.
Versuche zur Feststellung des Einflusses der Mineraldüngung auf die Nektarabsonderung der Obstgewächse. (**The effect of fertilizers on the nectar secretion of fruit trees.**)
*Bienenzucht*, 1952, **5**: 270-1, from abstr. in *Bee World*, 1959, **40**: 49-50.
Apple trees given complete fertilizers produced twice as much nectar as controls.

x Proebsting, E. L., Jr.
**Yield, growth, and date of maturity of Elberta peaches as influenced by soil management systems.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 92-101, bibl. 13.
A fuller account of work described in *H.A.*, 28: 141.

y SHARPE, R. H., AND SHOEMAKER, J. S.
**Development of temperate-climate fruits for Florida.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 294-300, bibl. 6.
With emphasis on peach, blackberry and blueberry breeding.

z SPOOR, P. A.
De rentabiliteit van fruitteeltbedrijven. (**The profitability of fruit farms.**) [English summary ¾ p.]
*Meded. Dir. Tuinb.*, 1959, **22**: 28-35.
Comparisons between holdings in 4 fruit-growing areas of Holland.

2187.

a STANNEK, G.
Erzeugungsleistungen, Wirtschaftsergebnis und Arbeitsproduktivität im Strassenobstbau. (**Yields, economics and labour costs of fruit trees grown on road verges.**)
*Dtsch. Gartenb.*, 1959, **6**: 80-3.
In Eastern Germany.

b U.S. AGRICULTURAL MARKETING SERVICE.
**Improved loading of baskets of peaches and fresh prunes in railroad cars. A study of damage and cost reduction.**
*Mktg Res. Rep. U.S. Dep. Agric.* **275,** 1958, pp. 76, illus.
A full account of work noted in *H.A.*, 29: 1175f.

c VON VAHL, E.
Die Ausgangssorten für die modernen Apfelsortimente, I, II, III, IV. (**The origin of modern apple varieties, I, II, III, IV.**)
*Mitt. ObstVersuchringes Jork*, 1957, **12**: 93-9, bibl. 10, 146-8, bibl. 7, 187-8, bibl. 4, and 1959, **14**: 47-51, bibl. 17.
Dealing with Jonathan, McIntosh, Cox's Orange, Delicious and varieties derived from them.

d WERNECK, H. L.
Zur Ur- und Frühgeschichte der Pflaumen im oberen Rhein- und Donauraume. (**On the origin and early history of plums in the areas of the upper Rhine and Danube.**)
*Angew. Bot.*, 1959, **33**: 19-33, bibl. 13.
See also *H.A.*, 28: 2162.

e WOODHEAD, C. E.
**Grassed orchards in N.Z.: review of developments.**
*Orchard. N.Z.*, 1959, **32** (1): 5-15, bibl. 4.
Sward recommendations for growers.

f ZALEWSKI, W.
Zastosowanie metody munsella do obiektywnej oceny dojrzałości owoców pestkowych (czereśni i wiśni) w obrocie handlowym. (**The application of Munsell's method of objective assessment of the maturity of stone fruits (cherries and sweet cherries).**) [Russian and English summaries ½ p. each.]
*Prace Inst. Sadown. Skierniewice*, 1958, **3**: 237-52, bibl. 11.
Munsell's method, based on the percentage of certain pigments, was successful with cherries.

## SMALL FRUITS, VINES AND NUTS.

### *Small fruits.*

(*See also* 2025, 2082, 2095, 2125, 2186y, 2252a, c, g, h, l, n-p, r, s, 2417, 3089, 3094.)

2188. MINISTRY OF AGRICULTURE, LONDON.
**Bush fruits.**
*Bull. Minist. Agric. Lond.* **4,** revised 1959, pp. 32, illus., 4s.

The revision of this bulletin has entailed only minor changes in the sections on manuring and harvesting. Three new varieties are included in the black currant descriptive list and 2 old ones are dropped. Red currants and gooseberries are also dealt with.

2189. JOHANSSON, E., AND PÄÄSUKE, M.
Förvaringsförsök med odlade bär och plommon vid Alnarp 1954–1857. (**Storage trials with berries and plums at Alnarp 1954-57.**) [English and Esperanto summaries 1½ p. each.]
*Medd. Trädgårdsförs. Malmö* **118,** 1958, pp. 34, bibl. 10.

Methods of storage and the keeping quality of different varieties were compared for the following crops: *Strawberries:* A drop in temperature from 16° to 6° C. extended the storage period by about 3 days. Storage in polythene bags at 6° C. further extended the period, though at the expense of some loss in flavour. The keeping quality of Finn and Landia was good, but that of Ydun was poor. *Raspberries:* These should not be kept longer than 2 days at 14°–16° C. or than 4 days at 5°–7° C. The best results were obtained with closed but unsealed polythene bags in cartons at 6° C. The berries, while losing a little in flavour during storage, became more acid at low temperatures. Four varieties with good keeping quality were Willamette, Malling Exploit, Malling Jewel and Miranda. *Black currants:* The storage period was 4–5 days at 16° C. or 11–12 days at 5°–6° C., the flavour remaining unaffected. Closed polythene bags at 5°–6° C. provided very good storage conditions. *Plums:* The results showed that most European plum varieties, if picked at the right time, will keep for one week at about 15° C. or two weeks at 5° C., with an R.H. of 80%. Open polythene bags kept in cartons at about 5° C. provided the best conditions for storing plums.

2190. Darrow, G. M.
**Seed number in blueberry fruits.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 212-15, bibl. 2.

Seed numbers ranged from 15·7 to 73·8 per berry for highbush, and from 38 to 82 for rabbiteye, blueberry varieties. Lowbush selections and the early highbush species (*Vaccinium atrococcum*) had relatively few seeds. Small berries of Stanley averaged only 2·4 seeds as compared with 28·7 for large ones. Berries of the first picking had the most seeds per berry. [Author's summary.]—U.S.D.A., Beltsville, Md.

2191. Douglas, J., and van Doesburg, H. H.
De vermeerdering van blauwe bessen door middel van scheutstekken. (**Propagation of blueberries by shoot cuttings.**) [English summary ¼ p.]
*Meded. Dir. Tuinb.*, 1959, **22**: 98-104, bibl. 9, illus.

Cuttings of ripened wood with a heel were taken, and all but 4 or 5 leaves removed. The best times for taking the cuttings were just before and just after the end of the first flush of shoot growth. The use of 1% IBA is recommended.—I.V.T., Wageningen.

2192. Hall, I. V.
**Some effects of light on native lowbush blueberries.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 216-18, bibl. 2, illus.

Blueberry plants growing in low light intensities (under shade screens) produced short stems with comparatively small diameters and a high degree of branching. The number of sprouts with flower buds, as well as the total number of flower buds, decreased with decreasing light intensity. Maximum vegetative growth and flower bud formation occurred in full sunlight. Shading by shrubby weeds was shown to be a factor in decreased production.—Plant Path. Lab., Kentville, N.S., Canada.

2193. Trevett, M. F., and Carpenter, P. N.
**Nitrogen—the key to blueberry growth.**
*Me Fm Res.*, 1959, **6** (4): 19-22, illus.

Physical and chemical examinations were made of 215 samples from podzol soils used for blueberry growing in Washington County, Maine. The great majority were low in P, K, Ca and Mg, but medium to high in available Fe and Al. The periodical burning of trash, however, limited the power of these soils to develop available N from the humus, compared with unburned soils. Positive correlations were found between the amount of organic matter, total N and available K in the soil and the stem length of the blueberries growing thereon.
H.L.

2194. Gersons, L.
Voedingswaarde en verwerkingsmogelijkheden van blauwe bessen. (**The nutritional value and suitability for processing of blueberries.**) [English summary 14 lines.]
*Meded. Dir. Tuinb.*, 1959, **22**: 95-7, bibl. 17.

The vitamin C content is rather low, but the fruits contain neomyrtillin, which may be of value in diabetic diets. Processed blueberry products were promising but had less flavour than bilberry products.—I.B.V.T., Wageningen.

2195. Arcus, A. C.
**Proteolytic enzyme of *Actinidia chinensis.***
*Biochim. biophys. Acta*, 1959, **33**: 242-4, bibl. 3.

Incorporating raw Chinese gooseberries in table jellies prevents them from setting. It has been found that this is due to the presence of a hitherto undescribed proteolytic enzyme which attacks the gelatin. The properties of this enzyme, for which the name actinidin is proposed, are described briefly.—Nutrit. Res. Dep., med. Sch., Univ. Otago, Dunedin.

2196. (Cross, C. E.), and others.
**Annual Report 1956-1957 Cranberry Experiment Station.**
*A.R. Mass. agric. Exp. Stat. 1956-57*, being *Bull.* **503**, pp. 22-4.

*Weather.* Temperatures of 12–22° F. and 19–24° F. on two days in May and of 16-28° F. and 10–25° F. in October caused much loss to the cranberry crop. A telephone frost-warning system was in use. Observations were made on weather conditions during growth which favoured good quality crops. *Flooding.* Varying the time of flooding did not greatly affect berry quality. *Root growth.* Studies in the spring indicated that new roots appear just before the new uprights start developing on the runners. *Weed control.* Studies of ATA treatments each month, April to August, showed that only the June sprays significantly injured cranberry vines and reduced the crop. *Disease control.* Helicopter applications of fungicide concentrations at 23 × and 33 × gave higher yields than, and rot control comparable to, that achieved by ground applications of fungicides. Bees were not repelled by zineb and ferbam treatments. Fruit rot was significantly increased as an indirect result of the application of ammonia nitrogen. *Pest control.* Parasitism of fruitworm (*Mineola vaccinii*) eggs by *Trichogramma* sp. reached 75% on a neglected bog, but was generally lower on cared-for bogs. Both 5% rotenone and 100% ryania at 2½ lb. plus 2 lb. 50% DDT w.p. plus 2 oz. of a proprietary wetting agent per 100 gal. were as effective as 7 lb. rotenone or ryania plus wetting agent per 100 gal. for the control of fruitworm. Heptachlor at ½ lb. per acre controlled weevils (*Anthonomus musculus*). *Storage.* Refrigerated racks proved their value in retail stores. *Blueberry diseases.* Five antibiotics tested at 2 concentrations against crown gall were unsuccessful and generally resulted in diminished yields.

2197. Marucci, P. E., and Moulter, H. J.
**Effect of maleic hydrazide on cranberry vines.**
*Proc. annu. Mtg Amer. Cranberry Grs' Ass.*, 1958, **88**: 36-42.

Two summer applications of MH at concentrations of 0·25% and 0·50% had the following results:—runner growth was inhibited and upright growth stimulated, the ability of blossoms to form fruit was not affected, fruit bud formation was slightly depressed, berry production was not altered nor was fruit size, berry colour and soundness were unchanged, and a slight inhibition of bud expansion occurred. It was concluded that MH is a promising "chemical pruner" for cranberries.—From *Weed Abstr.*, **8,** No. 591.

2198. Briggs, J. B.
**Methods for assessing resistance to *Amphorophora rubi* (Kalt.) in the raspberry.**
*A.R. E. Malling Res. Stat. 1958*, 1959, **A42**: 121-6, bibl. 8.

Techniques for forecasting resistance to *Amphorophora rubi* in raspberry varieties and seedlings in the insectary and for comparing infestations on individual seedlings in the field are described and discussed. Mass inoculation is used to locate resistance in potted varieties and selections in the insectary. A simple test for seedlings, using 3 inoculations of a single aphid, gave a very accurate forecast of resistance derived from Baumforth A, judged by subsequent field observations at East Malling. The use of leaf samples to estimate relative degrees of infestation in the field was examined and found adequate to check the resistance of Baumforth A derivatives in the field during the early part of the season. Unusual behaviour of the aphids on the variety Norfolk Giant is reported. [Author's summary.]

2199. Bergelin, E., and Sahlström, H.
Sortförsök med röda vinbär 1943-1957. **(Red currant variety trials 1943-57.)** [English and Esperanto summaries ¾ p. each.]
*Medd. Trädgårdsförs. Malmö* **116,** 1958, pp. 18, bibl. 6.

From trials with 11 varieties, carried out in several provinces of Sweden, Houghton Castle emerged as the heaviest cropper in the South, and Red Dutch, followed by Houghton Castle and Earliest of Fourlands, in the North. These three latter varieties are recommended for localities where hardiness and resistance to leaf-fall disease are desirable.

2200. Ministry of Agriculture, London.
**Strawberries.**
*Bull. Minist. Agric. Lond.* **95,** sixth edition, 1958, pp. 46, illus., 4s. 6d.

Revisions in this edition are relatively few, the main bulk of the information remaining unaltered from the fifth edition [*H.A.*, 25: 3637]. New names are included in the variety section, notably those of Cambridge seedlings, and varieties suitable for processing are given. Other new items are chemical weed control, pre-cooling, and additional information on green petal disease. In Appendix I the Certification Scheme for 1958 is described.

2201. Darrow, G. M.
**Strawberry culture. South Atlantic and Gulf Coast regions.**
*Fmrs' Bull. U.S. Dep. Agric.* **1026,** revised 1958, pp. 36, illus.

Commercial strawberry growing in the Southern States is important for the early season of ripening, commencing with the marketing of fruit from Florida in December and January. Growing practices are very different from those in other parts of the country. The plants are set on ridges to obviate the effects of poor drainage. Planting can be done at any season of the year. Various planting systems are described with the resulting crop yields; also methods of cultivation, the growth and fruiting habit of the plant, suitable varieties, and disease and pest control. Particular mention is made of nematodes, which are a serious pest in this region. M.C.S.

2202. Morrow, E. B., Comstock, R. E., and Kelleher, T.
**Genetic variances in strawberries.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 170-85, bibl. 24.

An investigation is reported, from which estimates of genetic and environmental variances and covariances in 8 characters were obtained. These estimates are employed to evaluate the "seedling square" as a basis for preliminary selection among genotypes, to predict improvement possible from selection for the various traits, to evaluate certain scores as bases for selection aimed at yield improvement, and to investigate probable correlated responses in certain other characters to selection based on yield. It appears that the "seedling square" is an entirely adequate basis for preliminary selection, that there is sufficient genetic variation to allow very considerable genetic improvement in fruit yield, and that family selection is not likely to be more effective than selection among individual genotypes. Prolificacy, vigour, and square size scores should be of some value in selection aimed at yield improvement, but not as effective as selection based on measured yield. No undesirable correlated responses to selection for fruit yield were indicated. [From authors' summary.] A "seedling square" comprises a seedling plant and runner plants derived from it, which are allowed to develop to 2×2 ft.—N.C. St. Coll., Raleigh.

2203. Watson, W. W.
**Tests show best berries for Delta.**
*Miss. Fm Res.*, 1958, **21** (11): 7.

Trials with 12 strawberry varieties at the Delta Branch Experiment Station are described. The three outstanding varieties were Albritton, Dixieland and Pocahontas. Tennessee Beauty and Massey also cropped well under relatively unfavourable climatic conditions. M.C.S.

2204. Heggli, M., and Thorsrud, J.
Sortsforsøk med jordbaer 1951-57. (**Strawberry variety trials 1951-57.**) [English summary 15 lines.]
*Forskn. Landbruk.*, 1959, **10**: 33-55, bibl. 6.

Of 20 varieties tested, only Abundance and Ydun could be recommended for commercial strawberry production in Norway. Ydun gave the highest yields, but the quality of its fruit was not equal to that of Abundance, especially when preserved or frozen after transport.—State Exp. Stat., Kise, Nes, Hedmark.

2205. Rogers, W. S., and Fromow, M. G.
**Royal Sovereign strawberry clone M.415.**
*A.R. E. Malling Res. Stat. 1958*, 1959, **A42**: 60-2.

The new clone of Royal Sovereign strawberry M.415 yielded 11% more fruit than the clone M.48 in 3 replicated trials, over a period of 8 years. The increased yield came mainly in the later picks, and from a longer cropping season. Both clones were indexed as virus free, and showed no difference in morphology or size of plant. The small, but consistent, difference in yield is considered as evidence of a mutation. The clone M.415 is now being propagated by the Nuclear Stock Association. [Authors' summary.]

2206. Bringhurst, R. S., and Voth, V.
**Summer-planted Solana berries.**
*Calif. Agric.*, 1959, **13** (4): 6, 15.

Early yields from Solana strawberries planted on 20 August and 5 September compared favourably with those from summer-planted Lassen, but planting on 20 September was too late for satisfactory early yields. Winter planting is not recommended.

2207. Richards, M., and Slade, D. N.
**Propagation of strawberries by disc cuttings—rapid increase from limited stock.**
*N.Z. Comm. Gr*, 1958, **14** (5): 10, illus.

Young crowns from a single plant of Talisman were cut into discs $\frac{2}{5}$ in. thick, which were rooted in a closed frame at 70° F. Root growth was better with discs grown in a sandy soil mixture and covered with peat than with uncovered discs. At temperatures lower than 70° F. plant growth was slower.—Massey agric. Coll.

2208. Worthington, J. T., and Scott, D. H.
**June-set strawberries.**
*Amer. Fruit Gr*, 1959, **79** (4): 34-6.

Strawberry plants were stored for 6 months in polythene-lined crates at 30° F., before planting out in early June. High yields of good quality fruit were produced in the following year by 7 of the 8 varieties tested.

2209. Voth, V., and Bringhurst, R. S.
**Fruiting and vegetative response of Lassen strawberries in southern California as influenced by nursery source, time of planting, and plant chilling history.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 186-97, bibl. 9.

Differences in plant vigour and production were associated with the amount of chilling which the plants had received. Chilling received in the propagation nursery, in storage at 28° F., or after planting proved equally effective. Semi-continuous summer fruiting was associated with inadequate chilling.—Univ. Calif., Davis.

2210. Rezničenko, A. G.
**Strawberry branching habits.** [Russian.]
*Dokl. Mosk. s-h. Akad. im. K. A. Timiryazeva*, 1957, No. 28, pp. 284-90, from *Ref. Ž.* (*Biol.*), 1958, No. 9, Abstr. 39,504.

Character and rate of branching depend on variety and environmental conditions. Varieties which make vigorous early growth and branch freely (Mysovka, Roščinskaja) are earlier bearing but less hardy, while those which branch less freely (Komsomolka, Saksonka) are later bearing with greater longevity and hardiness.

2211. Rom, R. C.
**Development and nutrition of strawberry plants grown on Plainfield sand.**
*Diss. Abstr.*, 1959, **19**: 1509-10, being *L.C. Card No. Mic.* 58-7531 of 116 pp.

Root studies showed that the number of primary roots and their initial penetration were independent of soil moisture, but subsequent growth in length and branching were affected adversely by either dry or saturated soil. Runner plants became independent of the mother plant only when a large percentage of the roots had branched. The rate of production of primary roots declined as the season advanced. The area of root distribution was conical. Irrigation did not generally alter plant composition, except that under dry conditions the N content increased. Plants grown in a matted row were less vigorous than those grown in a spaced plant system, and their contents of P and K were smaller. Significant differences in the number of flower buds produced were not related to the vigour and mineral composition of spaced plants. Plants in matted rows produced significantly fewer flowers than single plants in a row. Early-rooted runner plants, growing without competition from other plants, produced numbers of flowers similar to those of the more vigorous parent plants.—Univ. Wis.

2212. EHLIG, C. F., AND BERNSTEIN, L.
**Salt tolerance of strawberries.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 198-206, bibl. 10.

The osmotic pressure of the nutrient solution was the predominant factor in determining the growth of Lassen and Shasta strawberries in sand culture. High concentrations of Cl in the substrate caused marginal scorch on mature leaves; Na also produced some marginal scorch, but the accumulation of Na in the leaves was slower than that of Cl. Shasta accumulated more Cl and Na than did Lassen. In beds 6 in. high, Cl injury and yield reductions resulting from salt accumulation were greater than in 3-in. beds. Salinity decreased berry size but increased sugars and titratable acids within certain limits. Plants survived higher salt concentrations in the autumn than in the following spring.—U.S. Salinity Lab., Riverside, Calif.

2213. HITZ, C. W.
**Chemical control of plant populations in strawberries.**
*Bull. Del. agric. Exp. Stat.* **324,** 1959, pp. 38, bibl. 37, illus.

Blakemore strawberries were subjected to 3 treatments: (*a*) matted row culture; (*b*) three spray applications of maleic hydrazide at 1,000 p.p.m. to run-off, between 1 August and 15 September; and (*c*) hand pruning of growing points at weekly intervals starting on 1 August. The greatest reduction in runner elongation and daughter plant formation was obtained from hand pruning, and crown size and the yield and size of fruit were also the greatest from this treatment. Compared with the matted row treatment, the MH spray caused a reduction of daughter plant formation and an increase in yield [for earlier work see *H.A.*, 27: 191]. The basic responses to the population control treatments were not materially altered by modifying the nutritional and soil moisture levels. While the general reaction of other varieties to the treatments was similar to that of Blakemore, the timing and concentration of the MH spray needed to be worked out for each variety and for each latitude at which the variety was grown.

2214. SMITH, W. L., Jr., AND HEINZE, P. H.
**Effect of color development at harvest on quality of post-harvest ripened strawberries.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 207-11, bibl. 2.

In general, fully-coloured, freshly-picked berries had the highest flavour rating, and berries picked at quarter-colour and ripened at 70° F. had the lowest. Chemical analyses of the artificially-ripened fruit indicated that fruit picked with less colour contained less sugar and more acid than fruit picked when fully coloured. All sweetened berries received higher flavour ratings than did non-sweetened berries. The appearance of the ripe berries from the different stages of colour development was not appreciably different, except for increased drying of the caps on berries that needed 3 or 4 days at 70° F. for ripening. Decay during ripening was most prevalent in berries picked with the least colour.—U.S.D.A., Beltsville, Md.

2215. MAXIE, E. C., MITCHELL, F. G., AND GREATHEAD, A.
**Studies on strawberry quality. [Part 2.]**
*Calif. Agric.*, 1959, **13** (2): 11, 16.

Respiration of Shasta fruits increased with temperature, and at 86° and 100° F. fruits were quickly destroyed by the speed of their own metabolism. Mould appeared after 2½ days in berries kept at 68° F., and after 11 days at 32° F. Quality was quickly lost when fruit was kept for 2 hours at 85° F. before cooling; hence cooling as soon as possible after picking is necessary to maintain quality. [For Part 1, see *H.A.*, 29: 1197.]

2216. WINTER, M., AND OTHERS.
**Investigation of the volatile aroma compounds of strawberries by column and paper chromatography.** [German?]
*Riechstoffe u. Aromen*, 1958, **8**: 252-3, 282-4, bibl. 18, from abstr. in *J. Sci. Food Agric.*, 1959, **10**: i-154-5.

Major constituent alcohols were 2-ethylhexanol 14·1 wt.-%, saturated alcohol $C_6$ 10·7, traces of ethanol and methanol 1·2 wt.-%; free acids and acid components of esters were acetic, *n*-butyric, *iso*-butyric, *n*-capronic in strong concentration and traces of formic and propionic; carbonyl compounds, acetaldehyde approximately 4, acetone 1·3, diacetyl 0–0·03, hexanol 0·03–0·2 p.p.m., respectively, and traces of other carbonyl compounds.

### *Vines.*

(*See also* 2025, 2051, 2134, 2135, 2175, 2252d, j, k, q, 2369, 2383, 2819, 2823, 3085.)

2217. DALMASSO, G., AND TYNDALO, V.
Viticoltura e ampelografia dell'U.R.S.S. **(Viticulture and ampelography in the U.S.S.R.)**
*Atti. Accad. ital. Vite 1957*, 1958, **9**: 446-549, illus.

This account should prove useful to viticulturists who are interested in Russian viticulture and can cope with Italian but not with Russian. It appears to be based on two Russian works, one entitled

Ampelography in the U.S.S.R. and the other the Vine section of the Agrarian Encyclopaedia of the U.S.S.R., prepared by A. M. Negrul. Areas devoted to vines in the U.S.S.R. are mainly in the south. They are found as follows: Georgia: 71,000 ha. with research institute at Telavi. Azerbaidjan: 33,000 ha. with institute at Kirovabad. Armenia: 16,000 ha. Daghestan: 4,000 ha. with institute at Derbent. Uzbekistan: 28,000 ha. Turkmenistan: 3,800 ha. Tadjikistan: 8,000 ha. Kirghisici: 536 ha. with an experimental station at Frunse. Kazakhstan: 2,000 ha. Moldavia: 98,000 ha. with an institute at Kisanev. Ukraine: 60,000 ha. with an institute (Tairov) at Odessa. Crimea: 12,000 ha. with an institute (Magarach). Stauropol: 11,500 ha. Krasnodar: 17,800 ha. served by the Crimean institute (Magarach) at Yalta. Don Region: 4,000 ha. In some, especially the older vine districts such as Georgia, phylloxera is either rife or would be rife were it not for the use of resistant rootstocks. An account is given of the characters of the very many vine species used in different parts of the U.S.S.R. and of their usefulness. No modern figures of yield are given, but those given for pre-1914–18 war are very low.

2218. ACCADEMIA ITALIANA DELLA VITE E DEL VINO.
*Atti Accad. ital. Vite 1957.* (**Proceedings of the Italian Academy of Vines and Wine, 1957**), 1958, Vol. **9**, pp. 576, illus.

This large volume, as might be expected, deals with viticulture as practised in different parts of Italy and its very pressing, everyday problems. Thus N. Breviglieri and E. Casini give an account of frost damage and its repair in the famous Chianti district; I. Cosmo writes of 2 very promising rootstocks showing virtues of resistance to phylloxera and compatibility, and C. Marescalchi gives the Italian view of probable effects of the forthcoming European common market. Others deal with problems of wine making and grape juice production. Long articles are devoted to mechanization in viticulture and viticulture in the U.S.S.R. [see separate abstracts].

2219. LOOMIS, N. H.
**Growing American bunch grapes.**
*Fmrs' Bull. U.S. Dep. Agric.* **2123,** 1959, pp. 22, illus., 15 cents.

American bunch grapes originated with the so-called fox grape (*Vitis labrusca*) crossed with the frost grape (*V. riparia*), *V. rupestris*, *V. champini*, *V. lincecumi* and others including the European grape (*V. vinifera*). Descriptions are given here of 20 tested varieties. General notes follow on climate, site, soil, propagation by cuttings and with the help of named rootstocks, grafting and budding, preparation of land, spacing, formation of trellis, planting, training and pruning, cultivation, weed control, cover crops, fertilizers, harvesting, and yields, which are noted as being about 3 tons per acre from good vineyards in the East and Mid-west rising to 4–5 tons per acre from the irrigated vineyards of Washington State.

2220. STEFANELLI, G.
Aspetti e problemi della meccanizzazione della viticoltura. (**Mechanization in viticulture, its aspects and problems.**)
*Atti Accad. ital. Vite 1957*, 1958, **9**: 29-93, bibl. 44, illus.

For the Anglo-Saxon reader this article, written with special regard to the hillsides of Italy, will mainly be of interest as a source of French and Italian literature on mechanization in the vineyard and as listing, illustrating and giving considerable detail of the many machines now being used by viticulturists in France and North Africa.

2221. VIVONA, A.
I portinnesti siciliani della vite. Parte I. (**Sicilian vine rootstocks. Part I.**) [English summary ½ p.]
*Ann. Sper. agrar.*, 1958, **12** (6): Suppl. pp. I-XXXII, and 1959, **13** (1): Suppl. pp. I-XXXI.

Descriptions are given and the qualities are assessed for Sicilian conditions of 7 rootstocks, being various crosses of Berlandieri, Rupestris, Riparia and Aramon, their shortened names being 140 Ruggeri, 1103 Paulsen, 1045 Paulsen, 775 Paulsen, 225 Ruggeri, 779 Paulsen and 1447 Paulsen. Their distribution in Sicily is noted.

2222. MAMAROV, P., IVANOV, J., AND KATEROV, K.
Vliv pˇípravy semen révy vinné před setím na jejich klíčivost. (**The effect of pre-sowing treatment of vine seeds on germination.**) [English and Russian summaries ¼ p. each.]
*Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba*, 1958, **31**: 1211-16, bibl. 7.

In experiments in Bulgaria vine seeds stratified in moist sand at 2–6° C. for 120 days germinated better than seeds stratified for 25 days. Seeds soaked in water for 25 days germinated as well as seeds stratified for the same period. Seeds soaked for 3–10 days gave a lower percentage and uneven germination, and the germination of untreated seeds was slow. Seeds arising from open pollination usually showed a higher percentage germination than seeds arising from self-pollination.

2223. POTANINA, N. D., AND OTHERS.
**The influence of electrostatic fields on the rooting of vine cuttings.** [Russian.]
*Sad i Ogorod*, 1959, No. 2, pp. 64-5, illus.

Treatment of the basal 10 cm. of 50 cm.-long cuttings of the Amur vine (*Vitis amurensis*) in high tension electric fields greatly improved rooting. The best results were obtained by exposure to 4 kv./cm. for 5 sec.

2224. Tudosie, A. D., and Săndulescu, A. Observaţii asupra materialului săditor viticol in condiţiile nisipurilor de la Iveşti. (**Observations on the production of planting material for vineyards on the sandy soils at Iveşti.** [English, French, Russian and German summaries 1 p. each.]
*Grăd. Via Liv.*, 1958, **7** (11): 26-8, illus. +summaries.

In trials on the production of self-rooted vines the best results were obtained by planting cuttings 60 cm. long in furrows to a depth of $\frac{1}{3}$ of their length and providing a winter soil cover 4–6 cm. thick.

2225. Koberidze, A. V. **The union and production of vine grafts treated with growth stimulators.** [Russian.]
*Fiziol. Rast.*, 1958, **5**: 450-3, bibl. 11.

In trials in Georgia with the chlorosis-resistant rootstock 5BB (Riparia × Berlandieri) and the scion variety Činuri, heteroauxin and NAA applied in water solutions or in lanolin paste improved graft unions and early growth. Considering production of grafted plants, number of roots, weight, diameter and length of shoots, the best results were obtained when both the rootstock and scion were soaked in NAA at 10 mg./l. for 24 hours and the grafts were held in a glasshouse for 8 days before planting out.

2226. Manaresi, A., and Capucci, C. La fertilità dei polloni nella *Vitis vinifera*. IIª nota. (**The fertility of suckers in *Vitis vinifera*. 2nd note.**)
*Riv. Vitic. Enol.*, 1959, **12**: 71-9, bibl. 8, illus.

Suckers which fruited in 1956, after severe February frost damage to the parent vines [see *H.A.*, 28: 201], were removed in the early winter of that year and forced. They produced shoots bearing 1, 2, or even 3 bunches of grapes. Numerous further observations are recorded on the fruiting of suckers of frost-damaged and of severely pruned vines of 27 varieties. The yields from most plants reduced to 1–3 suckers ranged from 2·5 to 13 kg. per plant, and even the least fertile (Uva d'oro with 5 suckers per plant) had 40·3% of fruit-bearing shoots, while in the most fertile (Bianchino with 2 suckers) the percentage was 84·5.

2227. Szegedi, S. Plantation profonde des vignes de sable. (**Deep planting of vines on sand.**) [English and Russian summaries $\frac{3}{4}$ p. each.]
*Acta agron. hung.*, 1958, **8**: 237-66, bibl. 20, illus.

Soil surface temperatures exceeding 60° C. on yellow drift sand in the area between the Danube and the Tisza result in the aerial parts of vines being destroyed within 2 years of planting through the killing of the vascular meristems by heat radiation from the soil. New tops subsequently arise from the second node under the surface, and these survive. It was found that tops arising at a depth of 3 cm., where the temperature was as much as 25·6° C. below that on the surface, develop normally, and to achieve this so-called deep planting is recommended.

2228. Hayslip, N. C., and Stover, L. H. **Effect of bedding and mulching on Lake Emerald grapes under culture on south Florida flatwoods sand.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 344-8, illus.

In a preliminary trial Lake Emerald grapes were grown successfully on beds 6 or 12 in. high. In the main trial vines growing on beds produced a fair crop of grapes, but a mulch of pangola grass + clover caused them to become too vegetative. Mulching on flat plots, however, improved vine growth.—Indian River Field Lab., Ft. Pierce, and Watermelon and Grape Invest. Lab., Leesburg.

2229. Bovay, E. Diagnostic foliaire de la vigne et action du porte-greffe sur l'alimentation du Chasselas. (**Leaf analysis of vines and the effect of rootstock on the nutrition of Chasselas.**)
*Rev. romande Agric. Vitic.*, 1959, **15**: 35-7, bibl. 3.

The author describes 3 plots of Chasselas on 3309 where leaf analysis has reflected the nutrient levels in the soil and sub-soil. In leaves of Chasselas grown on 143/B there were higher contents of N, P and K and lower contents of Ca and Mg than in plants on 3309. In another plot of Chasselas all nutrients were higher on 5-BB than on 3309.

2230. Boynton, D., Kimball, K., and Harding, P. **Sampling leaves and soil in grape vineyards and interpretation of their analysis in estimation of potassium fertilizer needs, an extension problem.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 139-48, bibl. 5.

The authors discuss experience gained, with special emphasis on K analyses. Decisions on the specific areas to be sampled within the vineyard, and the number and character of samples to be taken should be made after preliminary observations. In any one vineyard 2 or 3 samples chosen to represent contrasting situations appear to be more valuable in diagnosis than a single sample from vines of average or intermediate conditions. The limitations and values of soil samples taken in conjunction with leaf samples for extension [advisory] purposes are illustrated in this study. Data indicate that for extension samples taken in late August and early September a minimum level of 1% may be a satisfactory basis for recommending

K fertilization. Composite leaf samples taken for general extension purposes should be interpreted in terms of a minimum safe concentration of K, rather than of critical concentration. However, analyses of leaf samples from vines showing specific symptoms resembling K deficiency are of value in diagnosis. In the estimation of K demand, prognoses based on several years' observations and samples are very desirable. Soil analysis data in these studies did not provide an opportunity for definitive evaluation in diagnosis.—Cornell Univ., Ithaca and Geneva, N.Y.

2231. BLAHA, J.
Poznámky k zelenému hnojení ve vinicích. **(Observations on green manuring of vineyards.)** [French summary ¼ p.]
Reprinted from *Pol'nohospodárstvo*, 1958, **5**: 203-11, bibl. 4.

Experiments at Mutěnice, Czechoslovakia, have shown that green manuring provides an almost complete substitute for F.Y.M. but should be supplemented with mineral fertilizers. When sowing the green manure crop, applications of P and K at rates of 22 kg. $P_2O_5$ and 80 kg. $K_2O$ per ha. were beneficial. Of the crops tried a mixture of common vetch [*Vicia sativa*] and sand vetch [*V. villosa*], each at 100 kg. seed per ha., proved best.

2232. MAZZEI, A. M.
La potatura verde della vite. **(Summer pruning of vines.)**
*Ital. agric.*, 1959, **96**: 205-22, illus.

The term "summer pruning" is used here in a wide sense. The various practices are described, with illustrations of methods and instruments, and are critically discussed. They include sucker removal, disbudding and emasculation, shortening of new shoots, pruning of side shoots, defoliation and ringing of fruit-bearing shoots, disbunching, hand thinning of fruit, and artificial self-pollination.

2233. TAHA, M. W. A.
**Effect of severity of pruning on the nutrient-element content of Concord grape leaf petioles, vine vigor, yield, and fruit quality.**
*Diss. Abstr.*, 1958, **19**: 629-30, being *L.C. Card No. Mic.* 58-3464 of 143 pp.

Concord grapes subjected to 5 degrees of pruning showed no differences in leaf nutrient contents during 2 seasons. Contents of N, P and K in the petioles decreased during the growing season, while Ca, Mg and Mn increased. Fe, B and Mo decreased from June to July, and then increased from July to early August; Fe and B increasing only slightly while Mo increased sharply. No significant differences in vigour due to treatments were apparent after one complete year; this is considered to be partially a result of frost damage and mildew attack. Yields increased gradually as pruning severity decreased. Fruit quality improved as the crop became smaller and the leaf/fruit ratio increased. Acid content and pH of fruit juice were not as much influenced by pruning severity as were the soluble solids. Moderate pruning (30 buds left per vine for the first lb. of 1-year-old prunings removed plus 10 buds for each additional lb. of prunings) is recommended for Concord vines under Ohio conditions.—Ohio St. Univ.

2234. MALAN, A. H.
**How to prune Alphonse Lavallée vines.**
*Fmg S. Afr.*, 1959, **34** (12): 55-6, illus.

Practical tests have shown that short bearing shoots only may be left along the arms of Alphonse Lavallée vines without any adverse effect on yield or growth.—W.P. Fruit Res. Stat., Stellenbosch.

2235. HUGLIN, P.
Recherches sur les bourgeons de la vigne: initiation florale et développement végétatif. **(Studies on vine buds: floral initiation and vegetative development.)** [English, Russian and German summaries ¾ p. each.]
*Ann. Amél. Plantes*, 1958, **8**: 113-272, bibl. 75, illus.
Les inhibitions de croissance par corrélations chez les bourgeons de la vigne. **(Growth inhibition due to the reciprocal influence of vine buds.)**
*Progr. agric. vitic.*, 1958, **149**: 201-8, bibl. 5.

Flower initiation in Alsatian vineyards began about mid-June in primary latent buds at the base of unripened shoots, continued in buds higher up the shoot and was completed during August. Vine varieties grown in Alsace are classified in 3 fertility groups, the most fertile being Riesling and Sylvaner. In general, yields from hybrid vines were higher than those from vinifera varieties. Bud fertility was chiefly dependent on the vigour of the parent plant, and increased with improved vigour up to a certain level. Both temperature and moisture had some effect on fertility. There was no evidence that the current crop affected bud fertility. Certain rootstocks showed an effect on yields which was independent of vigour. Cropping of Riesling and Sylvaner was more regular than that of some other varieties. The fertility of secondary and terminal buds, as well as those on old wood, was low in the hybrid varieties and slightly higher in viniferas. Latent buds on water shoots were as fertile as those on normal shoots. The vegetative development of lateral buds was inhibited by the terminal bud, but vigorous growth was able to overcome this effect. Latent buds on unripened shoots were completely inhibited by the terminal bud, by the side shoots, and, to a lesser extent, by adult leaves. This inhibition only lasted a few weeks, after which the latent buds became dormant. Dormancy was broken by glycol monochlorhydrin. In one-year-old shoots the correlation between

lateral buds and latent buds disappeared, and was replaced by a type of inhibition which was related to vine vigour and dormancy. The type of branching in *Vitis vinifera* was strongly influenced by vigour (which is related to methods of pruning and training) and was weakly influenced by fixed characteristics (the apical tendency of unpruned vines, latent bud structure more or less developed and the dormancy gradient of buds).
In the second article the author discusses the reciprocal inhibitory influences which exist between buds on shoots of the current season and buds on one-year-old shoots.—Stat. Rech. vitic. oenol., Colmar.

2236. Pastena, B.
Metodo per il germogliamento ritardato nella vite. (**Method for retarding bud burst in vines.**)
*Frutticoltura*, 1959, **21**: 53-60, bibl. 19, illus.
Pergola-trained vines in the Palermo area were pruned in January, using the following treatments: (1) leaving long shoots of ½, 1, 1½, and 2 m., and spurs with 3 buds each; (2) as in (1) but removing all the buds except the 3 basal ones from the long shoots; (3) leaving the 2 uppermost, as well as the 3 basal, buds on the long shoots. Opening dates were recorded for the 3rd bud from the base and the apical bud (where present) on long shoots, and for the apical bud on spurs. Except on the long shoots of group 1, practically all the recorded basal buds in all 3 groups had opened by 28 March, the earliest being those on the spurs of all groups. Approximately 12% of the buds on long shoots of group 3 were delayed for 1–2 days beyond this date, but on the long shoots in group 1 the delay was from 2 to 7 days. The greater the length of the shoots up to 1½ m., the higher was the percentage of basal buds delayed and the longer was the delay. Apical buds on the long shoots of group 1 opened before basal buds, the interval being 1–14 days, and in most cases more than 2 days. In group 3 just over 30% of these shoots had the recorded basal bud open before the apical bud, the interval being 1–8 days with an average of 2–3 days. In 17% the opening was simultaneous, and in the rest the apical buds preceded the basal by not more than 8 days, the average being 4 days. Thus the removal of apical and medial buds caused long shoots to behave as spurs, and emphasized the existence of a basal pole of activity. This was also evident in 20% of the shoots with all their buds present, where the sequence of opening was: apical, basal, medial. Method 1 was obviously better than the others for protection against spring frosts.

2237. Weaver, R. J.
**Prolonging dormancy in *Vitis vinifera* with gibberellin.**
*Nature*, 1959, **183**: 1198-9, bibl. 6.
Gibberellin at concentrations up to 250 p.p.m. was sprayed on Zinfandel and Tokay vines at the beginning of September. The number of shoots which emerged in April from the treated vines decreased with increasing concentration of gibberellin. Cuttings, which were taken in December and kept with their bases in gibberellin, also showed a greater delay in bud burst as the concentration of gibberellin increased.—Univ. Calif., Davis.

2238. Constantinescu, G., Lăzărescu, V., and Poenaru, I.
Criterii biologice pentru stabilirea momentului de inflorire la viţa de vie (*Vitis vinifera sativa*). (**Biological criteria for determining the beginning of flowering in vines.**) [Russian and French summaries.]
*Bull. ştiinţ. Acad. RPR, Sec. biol.*, 1956, **8**: 827-46, from *Ref. Ž.* (*Biol.*), 1958, No. 5, Abstr. 20,516.
Extensive observations in Roumania have shown that the range in dates of bud burst for different vine varieties amounted to 17–23 days over a number of years. The fluctuation in dates for individual varieties in different years was 8–14 days. The duration of intensive shoot growth before flowering was 34–49 days with an annual difference for individual varieties of 8–14 days. The beginning of flowering can be determined from the number of leaves on the shoot. In most varieties flowering began after the appearance of 17–20 leaves. The varietal range in the dates of the beginning of flowering was 23 days. In different years the difference between the flowering dates of individual varieties was 14–18 days.

2239. Avramov, L.
Klijavost polena nekih sorti vinove loze. (**Pollen germination of some vine varieties.**) [English summary 1 p.]
*Arh. poljopr. Nauk.*, 1956, **9**: 22–36, bibl. 21, illus.
Pollen from morphologically and functionally hermaphrodite flowers germinated normally *in vitro*. Pollen germination in the field on morphologically hermaphrodite but functionally female flowers averaged between 21·4% and 68·3%, although maximum germination *in vitro* could, on occasion, reach 90%. Pollen germination was increased on sucrose media (10% and 20% sucrose). Climatic conditions had a marked effect on pollen germination. Pollen produced by morphologally hermaphrodite and functionally female flowers did not germinate.—Fac. Agric., Zemun.

2240. Samish, R. M., and Lavee, S.
**Spray thinning of grapes with growth regulators.**
*Ktavim*, 1958, **8**: 273-85, bibl. 18, illus.
Berry thinning was successfully carried out on

*V. vinifera* grape varieties by means of sprays applied either at the time of bloom or after fruit set. At the time of bloom, water sprays alone produced the desired amount of thinning; concentrations of 150 p.p.m. DNOC or 5 p.p.m. NAA did not increase the thinning effect of water sprays, while 20 p.p.m. NAA, or 150 [p.p.m. DNOC] and 5 p.p.m. NAA combined caused overthinning. At time of full fruit set consistently good results were obtained with 5 p.p.m. NAA; the bunches were overthinned above 10 p.p.m. NAA. Thinning sprays increased the proportion of the desired, moderately loose bunches by 20–50%. The amount of solid, dense bunches was reduced to negligible proportions and the number of straggly, very loose bunches was doubled; the latter amounted to less than 20% of the bunches and a very small portion of the weight of the crop. Thinning sprays did not reduce the yield nor increase the amount of shot berries in the varieties tested; thinning increased size of berry and hastened maturation of the fruit. The optimal concentration of NAA for spraying (5–10 p.p.m.) also caused a more rapid and uniform rate of fruit maturation. [Authors' summary.]

2241. Singh, D. P.
**Thinning of grapes with alphanaphthalene acetic acid.**
*Sci. and Cult.*, 1959, **24**: 384-5, bibl. 6.

Sprays of 10, 30 and 50 p.p.m. were applied as the flowers opened. The 50 p.p.m. spray gave the best results, viz. 15·7% fewer berries, a 19·4% increase in the average weight of berries but very little increase in the total weight of bunches.—Hort. Res. Inst., Saharanpur.

2242. Novak, J.
Uticaj smanjenja lisne površine na prinos grožđja i kiseline u širi kod vinove loze. (**The effect of reduced leaf surface of vines on quantity and quality of grapes.**) [English summary 1½ pp.]
*Arh. poljopr. Nauk*, 1958, **11**: 82-92, bibl. 2, illus.

The weight of grapes produced was reduced by 4·5% when 25% of the vine leaf surface was removed. A formula is given by which the probable crop loss after leaf damage may be forecast. When 75% of the leaf surface was removed, the sugar content of the grapes was reduced by 2·1% and the acidity of the must was increased by 0·75%.—Agric. Inst. Slovenia, Maribor.

2243. V., V.
Un anticipo di 20 giorni nella maturazione dell'uva. (**A 20-day advance in the ripening of grapes.**)
*Ital. agric.*, 1959, **96**: 163-4.

A brief evaluation of an article by F. Zito in *Inf. agrar.* [date not quoted], in which polythene sheeting on wooden frames, making tents in the form of truncated pyramids, shortened the ripening period and advanced the harvesting date for Panse Precoce dessert grapes by at least 20 days.

2244. Cooper, C. M.
**When should sultanas be harvested for drying?**
*J. Agric. S. Aust.*, 1958, **62**: 233-6.

Records taken over 5 years in South Australia showed that Baumé levels vary from season to season, but the rise in the curve of sugar content tends to flatten out about 19 February. The number of days with temperatures above 80° F. drops rapidly after mid-March. It is recommended, therefore, that sultanas should be harvested from mid-February to mid-March, any loss in weight being amply offset by savings in processing and dehydration and freedom from mould losses in poor drying seasons.

## *Nuts.*

(*See also* 2025, 2252e, f, i, m, t.)

2245. Esajan, G. S.
**Winter dormancy of buds and frost resistance in nut crops.** [Russian.]
*Fiziol. Rast.*, 1958, **5**: 463-7, bibl. 7.

When shoots of 3 nut species were brought indoors at intervals from October to March bud burst occurred earliest in almond, then in hazel and latest in walnut, indicating the duration of deep dormancy and the onset of latent dormancy. Almond buds on late season growth induced by summer pruning burst later than those on normal shoots, the summer pruning having prolonged the duration of deep dormancy. In this way buds which did not react to sudden temperature increases escaped damage from frost following a thaw. Foreign warmth-loving almond varieties required higher total temperatures for flower opening than Russian varieties, a point of practical importance in relation to the resistance of buds to winter thaws.

2246. Baldini, E.
Contributo allo studio delle cultivar di castagno della provincia di Arezzo. (**A contribution to the study of chestnut cultivars in the province of Arezzo.**)
*Pubbl. Centro Stud. Castagno*, 1958, No. 5, pp. 35, bibl. 31, illus.

The attempt is being made to infuse new life into Spanish chestnut growing in Italy, where it is menaced both by disease and by decreasing demand for its products. Here the author sorts out 13 main varieties found in Arezzo and gives particulars of them and of their suitability for growing in different parts of the province.

2247. Crane, H. L., McKay, J. W., and Hammar, H. E.
**Some things learned from a fertilizer experiment with Chinese chestnut on a Sassafras gravelly loam.**
*48th A.R. north. Nut Grs' Ass. 1957*, Mansfield, Ohio, pp. 66-72.

N, PKMg and NPKMg were applied to 2 varieties of Chinese chestnut in replicated trials on a free-draining soil of naturally low fertility. The results were somewhat inconclusive, though it was apparent that applications of N worsened already existing deficiencies of other nutrients, and *vice versa*. Until further information becomes available the application of a complete fertilizer in a 1–1–1 ratio at ½ to 1 lb./tree/year is recommended.—U.S.D.A., Beltsville, Md.

2248. Casella, D.
Per il miglioramento e l'incremento del nocciuolo in Italia. (**The improvement and increase in filbert cultivation in Italy.**)
*Ann. Fac. Sci. agrar. Univ. Napoli*, 1957/58, **23**: 1-22.

The chief centres of filbert production are Sicily, Campania, Lazio, Piedmont and Venice provinces. Filbert culture is beginning to replace chestnut growing where the latter is impeded by *Endothia parasitica* attacks. The plants are raised vegetatively from cuttings or in some cases by grafting. There is a large export of both shelled and unshelled nuts. The shape preferred for dessert nuts in Austria and Germany is long, but elsewhere in importing countries it is round and the extraction of shelled nuts is, moreover, easier when the nuts are round. Different districts have their own varieties and there is plenty of scope for improvement in varietal selection and cultivation methods.

2249. McKay, J. W., and Crane, H. L.
**Yields and leaf spot ratings of hickories in Beltsville plantings, 1949-57.**
*48th A.R. north. Nut Grs' Ass. 1957*, Mansfield, Ohio, pp. 61-5.

While most hickories produce low yields, grafted varieties were found to be superior to seedlings of the same age. Resistance to leaf spot, *Gloeosporium caryae*, varied in both varieties and seedlings. The varieties most outstanding in yield and leaf spot resistance were Lingenfelter, Schinnerling and Shaul. Several wild species and a few cultivated seedlings were completely immune from leaf spot, and their use in a breeding programme is discussed.

2250. Alben, A. O.
**Waterlogging of subsoil associated with scorching and defoliation of Stuart pecan trees.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 219-23.

Free water in the lower root zone of Stuart pecan trees in September and October was found to be positively correlated with scorching of leaves and premature defoliation of the trees from the tops downward. A waterlogged subsoil condition in April and May did not cause any visible injury. [Author's summary.]—U.S.D.A., Shreveport, La.

2251. Becker, G.
**The "perfect" black walnut huller.**
*48th A.R. north. Nut Grs' Ass. 1957*, Mansfield, Ohio, pp. 27-30, illus.

An illustrated description is given of a prototype huller, constructed from easily obtainable parts, which it is claimed obviates the manual cleaning of clogged conveyors. It uses an endless steel chain, which carries the nuts underneath 3 spring-loaded strippers to a wire mesh screen, which separates the nuts from the hull debris. The machine is operated by a ½-h.p. electric motor.

### *Noted.*

2252.

a Brauns, M.
Beitrag zur Züchtung mehltauresistenter Stachelbeeren. I. Untersuchungen über die Vererbung der Resistenz und die Anwendungsmöglichkeiten der Frühselektion. (**A contribution to the breeding of mildew-resistant gooseberries. I. Studies on the genetics of resistance and the application of early selection.**)
*Züchter*, 1959, **29**: 51-7, bibl. 15, illus.
Resistance shown to be due to hypersensitivity.

b Cosmo, I., De Rosa, T., and Cappelleri, G.
Gli acuprici e il vino. (**Non-copper fungicides and wine.**)
*Riv. Vitic. Enol.*, 1959, **12**: 133-4, bibl. 2.
Suspicions that these cause unpleasant odour and flavour not confirmed.

c Eichholz, W.
Vorkommen des Sanddorns unter besonderer Berücksichtigung des nord- und mitteldeutschen Raumes. (**The occurrence of sea buckthorn, with special reference to northern and central Germany.**) [English and Russian summaries 7 lines each.]
*Arch. Gartenb.*, 1958, **6**: 387-403, bibl. 12, illus.
Including data on the vitamin C content of the berries of *Hippophaë rhamnoides*.

d Fabregues, J. M., and others.
Mécanisation de la viticulture. Rapports nationaux. Argentine, Autriche, Espagne, France, Italie, Luxembourg, Maroc, Suisse, Yougoslavie. (**Mechanization of viticulture. National reports. Argentina, Austria, Spain, France, Italy, Luxemburg, Morocco, Switzerland, Yugoslavia.**)

*Bull. Off. int. Vin.*, 1959, **31** (335): 69-91, (336): 41-6, 46-63, 63-87, and (337): 57-91, bibl. 18 in Italian report.
For the German report see *H.A.*, 29: 1212.

e GERRITSEN, C. J.
Een hoger rendement bij de teelt van hazelnoten. **(A higher yield from hazel nuts.)** [English summary 8 lines.]
*Meded. Dir. Tuinb.*, 1959, **22**: 105-11, bibl. 10, illus.
Causes of low yield include inferior varieties and poor land and husbandry.

f GRAVES, A. H.
**Chestnut breeding—report for 1957.**
*48th A.R. north. Nut Grs' Ass. 1957*, Mansfield, Ohio, pp. 76-86, bibl. 22, illus.
At Connecticut agric. Exp. Stat.

g DE HAAS, P. G., AND FROESE-GERTZEN, E.
Die Heidelbeere als Kulturpflanze und Handelsfrucht. **(The blueberry as a cultivated plant and a commercial fruit.)**
Reprinted from *Dtsch. GartenbWirtsch.*, 1958, Vol. 6, pp. 3, bibl. 33.
A consideration of commercial possibilities in Germany.

h JOHANSSON, E.
Aktuella bärsorter. **(Small fruit varieties [in Sweden].)**
*Sver. pomol. Fören. Årsskr. 1958*, 1959, **59**: 61-6, bibl. 8, illus.
Gooseberry, red and black currant, raspberry and strawberry.

i MCDANIEL, J. C.
**The pollination of Juglandaceae varieties. Part II: Notes during 1957.**
*48th A.R. north. Nut Grs' Ass. 1957*, Mansfield, Ohio, pp. 89-93.
Part I was noted in *H.A.*, 27: 2240y.

j MAZZEI, A., AND ZAPPALÀ, A.
Carricante, Minnella Bianca. **(The vine varieties Carricante and Minnella Bianca.)**
DEL GAUDIO, S., AND NICO, G.
Primitivo. **(The vine variety Primitivo.)**
COSMO, I., AND POLSINELLI, M.
Montù, Riesling Renano, Ortrugo, Sauvignon. **(The vine varieties Montù, Rhine Riesling, Ortrugo and Sauvignon.)**
*Ann. Sper. agrar.*, 1958, Vol. **12** (5): Suppl. pp. XXIX-XXXV, bibl. 5, XCVII-CIII, bibl. 6, CV-CXIII, bibl. 6; Vol. **12** (6): Suppl. pp. LXXVII-LXXXIII, bibl. 6, LXXXV-XCI, bibl. 5, XCIII-XCIX, bibl. 5, CI-CIX, bibl. 9, all illus.
Descriptions of 2 white, 1 red and 4 white wine varieties respectively.

k NEDELCHEV, N.
**The grapes and wines of Bulgaria.**
*World Crops*, 1959, **11**: 110-12, illus.
Including notes on the principal varieties.

l OLEKSIAK, W., AND OTHERS.
Wartość produkcyjna 15 odmian truskawek w rejonie Skierniewic w pierwszym roku owocowania. **(An evaluation of the first yield of 15 varieties of strawberries in the region of Skierniewice.)** [Russian and English summaries 1 p. each.]
*Prace Inst. Sadown. Skierniewice*, 1958, **3**: 91-100, bibl. 6.
In the first year Freia and Ydun came first with about 18 tons/ha.

m OZBEK, S., AND AYFER, M.
**An hermaphrodite *Pistacia* found in the vicinity of Antep, Turkey.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 240-1, bibl. 7, illus.

n REZNIČENKO, A. G.
**Basic rules of strawberry development.** [Russian, with English summary 3½ lines.]
*Izv. Timiryazev. seljsk. Akad.*, 1958, No. 6, pp. 73-92, illus.
With special reference to axis regeneration.

o RICHARDSON, C. S.
**Berry fruit growing—trends and prospects.**
*N.Z. J. Agric.*, 1958, **97**: 521-7, illus.
Acreages and production in New Zealand.

p SPYRA, E., AND HAMM, R.
Beitrag zur Aufwands- und Kostenkalkulation beim Folienmulchen dreijähriger Erdbeerkulturen. **(On the requirements and costs of mulching 3-year-old strawberries with plastic film.)**
*Dtsch. GartenbWirtsch.*, 1958, **6**: 143-7, from abstr. in *Informationsdienst Weihenstephan*, 1958, No. 11/12, pp. 203-4.
Using 0·08 mm. black polythene film.

q STEWART, W. S., HALSEY, D., AND CHING, F. T.
**Effect of the potassium salt of gibberellic acid on fruit growth of Thompson Seedless grapes.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 165-9, bibl. 2, illus.
See *H.A.*, 28: 2291.

r WALDO, G. F.
**Blackberry varieties in Oregon.**
*Fruit Var. hort. Dig.*, 1958, **13** (2): 28-30, illus.
Eleven varieties described.

s WILCOX, A. N.
**The Earlimore strawberry.**
*Minn. Hort.*, 1959, **87** (1): 5, 7, illus.
A new June bearing dessert variety developed by the University of Minnesota.

t ZARGER, T. G.
**Nursery techniques in producing nut trees.**
*48th A.R. north. Nut Grs' Ass. 1957*, Mansfield, Ohio, pp. 35-41, bibl. 4.
Successful methods of propagating black walnut, Chinese chestnut, filbert and other nut trees in Tennessee.

## PLANT PROTECTION OF DECIDUOUS FRUITS.

### *Disturbances of nutrition or of uncertain origin.*

(*See also* 2125, 2126, 2212, 2277, 2367c, e.)

2253. Batjer, L. P., and Benson, N. R.
**Effect of metal chelates in overcoming arsenic toxicity to peach trees.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 74-8, bibl. 7, illus.

The effect of a build-up of toxic levels of As in old apple soils was overcome by soil or foliar applications of Zn and Fe chelates, and by soil applications of Zn sulphate. A chelate application to the soil of 1–2 lb. per tree corrected As injury of peach trees, a spring application being more effective than an autumn treatment. A 5-lb. application of Zn sulphate was as effective as the best chelate treatments. Spray applications of ZnEDTA effectively reduced As toxicity, being equal to or better than soil treatments. Arsenic contents of leaves were reduced by the chelate sprays.—U.S.D.A., and Wash. St. Coll., Wenatchee.

2254. (Dunlap, D. B., and Thompson, A. H.)
**York spot controlled!**
*Amer. Fruit Gr*, 1959, **79** (4): 48-9.

Application of a boron spray (Solubor, containing 20·5% actual B) to York Imperial apple trees during flowering gave effective control of bitter pit. Storage studies have not yet been completed. Two sprays of Solubor at 1 lb./100 gal. are recommended, viz. one 4 days after full bloom, followed by another at petal-fall.—Md agric. Exp. Stat.

2255. Naef, J., and Gerber, H.
Versuche zur Bekämpfung der vorzeitigen Rotverfärbung bei Reben. (Magnesiummangel.) **(Experiments on the control of premature reddening in vines. (Magnesium deficiency).)**
*Schweiz. Z. Obst- u. Weinb.*, 1959, **68**: 111-13.

A repetition of earlier experiments [*H.A.*, 28: 224] showed again that 2% magnesium sulphate added to the post-blossom anti-mildew sprays could cure the trouble and improve grape quality.

2256. Cook, J. A., and Mitchell, F. G.
**Screening trials of chelated zinc materials toward the correction of zinc deficiency in vinifera grapevine.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 149-57, bibl. 11, illus.

Soil and foliage applications of 5 zinc chelates were not superior to inorganic sources of Zn for the correction of Zn deficiency in several Californian vineyards. ZnHEEDTA was found to be the chelate most likely to be toxic to vines.—Univ. Calif., Davis.

2257. Cook, J. A.
**Field trials with foliar sprays of Zn-EDTA to control zinc deficiency in California vineyards.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 158-64, bibl. 6.

Various zinc treatments were compared for the correction of Zn deficiency, and significant but erratic yield increases were obtained with pre-blossom sprays of Zn-EDTA and of inorganic Zn. Vines with obvious deficiency symptoms contained less than 15 p.p.m. Zn in mid-summer shoot tips; among the Zn treatments compared none was followed by measureable increases in the Zn content of the shoot tips.—Univ. Calif., Davis.

2258. Pratella, G. C.
Ricerche sperimentali sulla maculatura non parassitaria delle foglie di melo. **(Experimental investigations on non-parasitic spotting of apple leaves.)**
*Frutticoltura*, 1959, **21**: 197-200, bibl. 4, illus.

Preliminary investigations showed that the disorder was not caused by copper fungicides, and that susceptibility was not influenced by variety, soil management or trunk height. The characteristic chestnut brown spots failed to appear in other extensive tests with copper and non-copper fungicides, with and without wetting agents, at relatively low temperature (16–17° C.) and R.H. 80–85%. These results do not agree with those of earlier investigations in Italy [see *H.A.*, 25: 412].

2259. Miller, P. W., Rawlings, C. O., and Painter, J. H.
**Blackline of Persian walnut.**
*48th A.R. north. Nut Grs' Ass. 1957*, Mansfield, Ohio, pp. 32-3.

Blackline, characterized in its advanced stage by a dark brown or black layer of corky tissue encircling the stem at the graft union, is the most important single cause of decline and death of Persian walnut on black walnut (*Juglans nigra*) rootstock in Oregon. The disorder is thought to be due to delayed incompatibility between stock and scion, and during a 7-year study it was found to be most prevalent in trees with trunk diameters of 11 to 13 in. No satisfactory method of control is known. For prevention the use of vigorous Persian walnut rootstocks is recommended.—U.S.D.A. and Ore. St. Coll.

### *Climatic factors causing injury.*

*See also* 2160, 2196, 2227, 2236, 2245, 2250, 2366h, p, s, t, 2367j.)

260. DJURDJEVIĆ, B.
Osetljivost sadnica raznih sorti jabuka i šljiva prema zimskim mrazevima 1953/54 u Peći. (**Susceptibility of different apple and plum varieties to frost during the winter of 1953/54 at Peć.**) [English summary 1 p.]
*Arh. poljopr. Nauk.*, 1956, **9**: 49-60, bibl. 15.

he frost hardiness of 145 apple varieties was ested and 43 were shown to be resistant. Only 3 lum varieties of 51 tested were frost resistant. eedlings of susceptible apple varieties were frozen t a temperature of −22° C., and plum seedlings ere frozen at −18° C. The resistant Mičurin pple varieties were slightly frost-susceptible in ese experiments.—Inst. agric. Res., Peć.

261. BIAŁOBOK, S.
Uszkodzenia mrozowe korzeni drzew i krzewów w szkółkach kórnickich w zimie 1955/56 r. (**Frost damage to roots of trees and shrubs in the nursery during the winter of 1955-56.**) [English and Russian summaries 2 and 3 pp. respectively.]
*Arbor. Kórnickie, 1957-58*, 1958, **3**: 179-203, bibl. 8, illus.

olish winters in general and that of 1955-56 in articular are discussed. Injury sustained by the ots of ornamental nursery stock, fruit tree edlings and clonal selections of Malling, Maurer nd Kórnik apple rootstocks is described and assified. All Malling types were seriously injured. he Maurer selections showed promise at first, t later their general behaviour was similar to that f the Kórnik stocks and out of 16 clones only o. M357 escaped injury.

262. EDGERTON, L. J., AND PARKER, K. G.
**Effect of nematode infestation and rootstock on cold hardiness of Montmorency cherry trees.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 134-8, bibl. 5, illus.

old hardiness studies showed that young Montnorency cherry trees growing in soils with a high opulation of *Pratylenchus penetrans* were less ardy than similar trees planted in soil given re-planting nematicidal treatment. Root injury aused by nematodes and secondary fungi resulted n reduced water and nutrient absorption, and such rees did not develop maximum winter hardiness. n these tests trees on mahaleb were more winterardy than those on mazzard.—Cornell Univ., thaca, N.Y.

2263. KARNATZ, H.
Über die Wirkung der Quittenunterlage au die Frosthärte der Ertragssorte bei Birnen. (**On the effect of quince rootstock on the frost resistance of the scion variety in pears.**)
*Mitt. ObstVersuchsringes Jork*, 1958, **13**: 327-8, bibl. 1.

In the winter of 1957/58 a mobile refrigerating plant [*H.A.*, 26: 3477] exposed maiden pear trees of two varieties on two seedling rootstocks and on Quince A to freezing temperatures. On bare soil the seedling stocks proved much hardier than the quince, but on soil covered above the union with organic materials or snow quince was at least as frost resistant as the seedlings.

2264. OLEKSIAK, W., WIŚNIEWSKA, J., AND JAUMIEŃ, F.
Uszkodzenia mrozowe 10 odmian malin w zimie roku 1955-1956. (**Winter injury to 10 varieties of raspberries in 1955-1956.**) [Russian and English summaries ½ p. each.]
*Prace Inst. Sadown. Skierniewice*, 1958, **3**: 83-90, bibl. 9, illus.

Winter injury was most severe with Souvenir de Paul Camenzind, Malling Promise and Lloyd George, and, under the microscope, injury to living bark, phloem and pith rays was apparent. A Malling seedling [unnamed] showed the least winter injury, and no tissue injury was observed.

2265. HOHL, P., AND OTHERS.
Dégats occasionnés par le gel au cours des dernières campagnes. (**Frost damage [to vines] during recent seasons.**)
*Bull. Off. int. Vin*, 1959, **31** (335): 41-68.

Reports on frost damage and protection of vines are presented from some European and North African countries, and from Turkey, preceded by a general survey. In Germany, plastic covering material was effective, but costly, and good results were obtained by covering the vines with sacking, cloths or matting; paper, however, increased frost injury. It was essential to avoid contact between the covering material and the plant. In France, paper or straw hoods used in small vineyards for individual vines gave good results, and glass gave better protection than plastic sheeting, but all involved high labour costs. Artificial fogs tested in France, Germany and Austria were generally too unstable to be satisfactory. In Hungary, and to a small extent in Tunisia, smoke from burning straw, etc., is used. Circulation of warm air by fans is not widely used in any of the countries concerned. The main objection to it is the small radius over which each fan is effective. In France and Germany, improved oil-burning heaters are widely and successfully used; sprinklers have given variable results, sometimes inexplicably poor. In Hungary, vines are often earthed up in winter. In France the soil is left compacted until frost risk has ended, and soil covers such as sod, forage crops or mulch are avoided. Air-flow barriers are installed above, and removed below, vineyards on slopes. Lists of vine varieties of high, moderate and low resistance to frost are given for Bulgaria. In France, spraying with 0·1% or 0·0875% NAA in January or February delayed bud burst for 15 days or more, with no reduction of fruit yield, but some delay in ripening.

2266. Nilsson, F., and Bjurman, B.
Sprickor på Ingrid Marie. (**Fruit cracking in Ingrid Marie.**)
*Sver. pomol. Fören. Årsskr. 1958*, 1959, **59**: 19-23, illus.

Observations showed that rapidly changing weather conditions were responsible for fruit cracking. Cultural measures which increase fruit size, such as thinning, are apt to accentuate cracking.

2267. Gerritsen, C. J.
Het barsten van kersen. (**Cracking of cherries.**) [English summary ¼ p.]
*Meded. Dir. Tuinb.*, 1959, **22**: 40-3, bibl. 10.

Among spray materials TMTD, captan and zineb have shown promise of reducing cherry cracking. Research into the climatic conditions causing cracking and on the morphology of "rain-resistant" fruits has been started.

### *Viruses.*

(*See also* 2366c, e, i, 2367f, 2696.)

2268. Canova, A.
Le virosi delle piante da frutto. (**Virus diseases of fruit crops.**)
Le virosi dei fruttiferi. (**Virus diseases of fruit trees.**)
*Frutticoltura*, 1958, **20**: 339-58, illus., and 1959, **21**: 211-23, illus.

The first article deals with the following virus diseases of apples: mosaic, flat limb, rubbery wood, proliferation (witches' broom), rough skin, ring spot, degeneration and star cracking. Reference is made in most instances to modes of transmission, including insect pests, and rootstock effects. The second is confined to peaches. The diseases covered are: mosaic, yellows, ring spot, rosette mosaic, rosette willow leaf, and rosette. Modes of transmission are discussed. Mosaic rosette is controlled by immersing affected material for 20–30 min. in water at 50° C. [For pear, quince and almond see *H.A.*, 29: 1250.]

2269. McCrum, R. C., and others.
**Recent studies on virus diseases of apple in the United States and Canada.**
*Suppl. Plant Dis. Reptr* **254,** 1959, pp. 36, bibls, illus.

The articles included in this number are: Observations in Maine on "stem-pitting", a virus disease of apple, by R. C. McCrum and M. T. Hilborn; Some observations on the effect of scion rooting in Virginia Crab intermediate apple stock in regard to stem pitting, by R. C. McCrum; The occurrence of stem-pitting and dapple apple virus disorders in an orchard propagated with known sources of varietal scionwood, by J. G. Barratt, W. W. Smith and A. E. Rich; Preliminary evaluation of some Russian apple varieties as indicators for apple viruses, and A survey for stem pitting in Indiana apple varieties, by G. I. Mink and J. R. Shay; Virus stem pitting of apple body stocks in British Columbia, and Preliminary results in the indexing of apple in British Columbia, by M. F. Welsh and F. W. L. Keane; Reaction of own-rooted trees of Spy 227 and Virginia Crab to infection with stem-pitting virus, Some pomaceous indicator hosts for the stem-pitting virus of apple, and Tolerance of some hardy apple stocks to the stem-pitting virus of apple, by D. F. Millikan and H. W. Guengerich.

2270. Posnette, A. F., and Cropley, R.
**The reduction in yield caused by apple mosaic.**
*A.R. E. Malling Res. Stat. 1958*, 1959, **A42**: 89-90, bibl. 1.

In 1950/51 23-year-old trees of 4 apple varieties were graft-inoculated with either a virulent or a mild strain of apple mosaic virus [*H.A.*, 26: 2574]. Yields were recorded for 6 years and corrected by covariance on the crop recorded prior to inoculation. Over the last 4 years of the period both strains of mosaic reduced the yields of Cox's Orange Pippin and Allington Pippin trees by about 30% compared with those of uninfected controls. Yields of Worcester Pearmain and Newton Wonder trees were, however, only slightly reduced. The authors draw particular attention to the effect of the mild strain of mosaic, which causes inconspicuous or no symptoms in most apple varieties.

2271. Parker, K. G., and others.
**Influence of ring spot virus on growth and yield of sour cherry.**
*Plant Dis. Reptr*, 1959, **43**: 380-4, bibl. 7.

The growth of Montmorency cherry propagated from buds infected by latent ringspot virus was up to 10% less than that of healthy trees, and yield was about 20% lower. Inoculation of healthy English Morello trees with recurrent ring spot virus caused an appreciable retardation of growth and a similar reduction of yield. The growth and yield of trees infected with latent ring spot virus were not affected by inoculation with recurrent ring spot virus. [From authors' summary.]—Cornell Univ., Ithaca, and N.Y. St. agric. Exp. Stat., Geneva.

2272. Peterson, G. W.
**Transmission and latency of cherry necrotic ring spot virus in *Prunus tomentosa.***
*Diss. Abstr.*, 1959, **19**: 1907, being *L.C. Card No. Mic.* 58-7566 of 75 pp.

Transmission of necrotic ring spot virus was considered not to occur mechanically. It was shown that NRS virus can exist in a latent condition in *Prunus tomentosa*.—Ia St. Coll.

2273. Pfaeltzer, H. J.
Onderzoekingen over de rozetziekte van de kers. **(Some investigations on rosette disease of cherry.)** [English summary 1 p.]
*Tijdschr. PlZiekt.*, 1959, **65**: 5-12, bibl. 11, illus.

It is proposed that the name rosette disease should be used instead of "Eckelrader disease" or "Pfeffingerkrankheit". Preliminary results have shown that the disease is soil-borne; healthy cherries planted in diseased soil showed primary symptoms of the disease after one winter.—Inst. PlZiekt. Onderz., Wageningen.

2274. Nyland, G.
**Hot-water treatment of Lambert cherry budsticks infected with necrotic rusty mottle virus.**
*Phytopathology*, 1959, **49**: 157-8, bibl. 4.

Budsticks from sweet cherry (variety Lambert) infected with necrotic rusty mottle virus were treated in a hot water bath at 50° C. for 10, 13 and 15 min., and at 52° C. for 5, 8 and 10 min. Virus inactivation occurred in all treatments. Seven of 10 Lambert trees that received buds treated at 50° C. for 15 minutes or at 52° C. for 10 minutes survived at least 2 years. Five of the 7 were still symptomless at that time. Treatments at 50° C. for 10 and 13 minutes and at 52° C. for 5 minutes were about 50% effective in inactivating the virus. [From author's summary.]—Univ. Calif., Davis.

2275. Omčikus, Č., and Blagojević, M.
Neka zapažanja o simptomima mozaika na raznim sortama smokve u Hercegovini. **(Observations on mosaic symptoms on different varieties of fig in Herzegovina.)** [French summary ½ p.]
*Zasht. Bilja*, 1957, No. 44, pp. 27-34, bibl. 7, illus.

A study of 41 fig varieties grown at Mostar showed that while all varieties showed mosaic symptoms on the leaves, only some of them had affected fruits. Three interchangeable forms occurred, viz. general mosaic, circular spots and vein chlorosis. Fruits showing circular spot mosaic usually dropped before maturity. Varieties thus affected should be eliminated.

2276. Pop, I. V.
O viroză păgubitoare a sîmburoaselor din R.P.R. **(A dangerous virus disease of stone fruits in Roumania.)** [English, French, Russian and German summaries ¾ p. each.]
*Grăd. Via Liv.*, 1958, **7** (10): 49-52, illus., plus summaries.

Symptoms of plum pox on plum, apricot, peach and myrobalan are described and varietal reactions noted. For prevention of spread, heat treatment of the budwood at 66·4° C. for 30 min., followed by treatment with 0·1% potassium bichromate or cobalt nitrate, is recommended.

2277. Chamberlain, E. E., Atkinson, J. D., and Hunter, J. A.
**Two diseases of plum causing distortion and internal necrosis of fruits.**
*N.Z. J. agric. Res.*, 1959, **2**: 174-83, bibl. 17, illus.

I. *Plum fruit crinkle*, a virus disease of plums, has been found on 3 trees of the variety Sultan. Symptoms are crinkling and internal necrosis of fruits and transient mottling and faint chlorotic line patterns on leaves. Symptoms resemble those of the virus disease known as plum pox in Europe. Plum fruit crinkle has been transmitted by budding and grafting from Sultan to Sultan, George Wilson and Shiro plum trees. II. *Plum false crinkle*, a physiological disorder, has been found on the varieties Billington, George Wilson, and Wright's Purple. Foliage symptoms occur only on the variety Billington. The disorder is not transmitted by grafting.—D.S.I.R., N.Z.

M.C.S.

2278. Harrison, B. D.
**Further studies on raspberry ringspot and tomato black ring, soil-borne viruses that affect raspberry.**
*Ann. appl. Biol.*, 1958, **46**: 571-84, bibl. 9, illus.

Soil infected with raspberry ring spot virus and the beet ringspot strain of tomato black ring virus became non-infective after treatment with formaldehyde or parathion. It is suggested that infection depends on some factor other than free virus in the soil, possibly the presence of an organism.—Scottish hort. Res. Inst., Invergowrie.

2279. McGrew, J. R., and Scott, D. H.
**Effect of two virus complexes on the responses of two strawberry varieties.**
*Plant Dis. Reptr*, 1959, **43**: 385-9, bibl. 16.

Plants of Catskill and Blakemore varieties of strawberry free of all except latent A virus were graft-inoculated with either mottle virus or with latent C plus leaf curl virus. In replicated field plots, plants infected with these complexes produced fewer runner plants, lower yields, and smaller fruit than those infected with latent A only. The virus complexes affected the two varieties differently; mottle complex was more severe in Blakemore and the other in Catskill. [Authors' summary.]—Agric. Res. Serv., U.S. Dep. Agric.

2280. Amici, A., Baldacci, E., and Refatti, E. In merito alla utilizzazione di piante test erbacee nella diagnostica della virosi della vite (degenerazione infettiva) per inoculazione meccanica. **(Evaluating the use of herbaceous test plants in diagnosing infectious degeneration of vines by mechanical inoculation.)** [English summary $\frac{3}{4}$ p.]
*Riv. Vitic. Enol.*, 1959, **12**: 103-8, bibl. 11.

Attempts to confirm the results of Ochs [see *H.A.*, 28: 250] were unsuccessful. Inoculation of 11 species with sap from infected vines gave completely negative results, and the reactions of *Datura stramonium* and tobacco were non-specific.

2281. Vuittenez, A.
Activité comparée des fumigants, des insecticides et de divers produits appliqués en traitement du sol sur les contaminations par la dégénéresence infectieuse de la vigne. **(A comparison of the effect of fumigants, insecticides and other products used for soil treatment on infection by infectious degeneration of the vine.)**
*C.R. Acad. Agric. Fr.*, 1958, **44**: 901-7.

Substances used included DD, chloropicrin, lindane, aldrin, silicate of methoxyethylene mercury, pentachloronitrobenzene, carbon disulphide, sulphur dioxide, ammonia, formalin and nabam. Trials in different parts of France show that, whereas strong insecticides, such as are highly effective against phylloxera, have little effect on the spread of infectious degeneration, soil fumigants such as DD, $CS_2$ and others are very effective in preventing it. It is known that nematodes are often rife in soils infected with infectious degeneration, and there are strong, but as yet unproved, indications that they may be responsible for transmitting this virus. [See also *H.A.*, 27: 2268.]—Stat. Path. vég., Colmar.

2282. Hewitt, W. B., Raski, D. J., and Goheen, A. C.
**Nematode vector of soil-borne fanleaf virus of grapevines.**
*Phytopathology*, 1958, **48**: 586-95, bibl. 52, illus.
**Nematode spreads a plant virus.**
*Agric. Res. Wash.*, 1959, **7** (7): 14, illus.

Experiments in the vineyard and in containers under controlled conditions demonstrate that fanleaf disease of grapevines in California is soil-borne and not air-borne, and that it is transmitted by *Xiphinema index*. Screenings containing nematodes from fanleaf soil, passed through a 40-mesh screen and collected on a 200-mesh screen, transmitted fanleaf virus to healthy *Vitis vinifera* var. Mission, growing in clay pots. *X. index* hand-picked from such screenings transmitted fanleaf virus to healthy Mission and to *V. rupestris* var. St. George growing in clay pots. *X. index* from the root zone of healthy Tokay grapes and from the root zone of figs, in separate tests, transmitted fanleaf from fanleaf-diseased St. George to healthy St. George growing in the same clay pot. In each test, healthy St. George growing with fanleaf St. George in clay pots remained healthy in the absence of nematodes. [Authors' summary.]—Univ. Calif., Davis.

2283. Ciccarone, A.
Degenerazione infettiva della vite, nematodi e fumigazione del suolo. **(Infectious degeneration of vines, nematodes and soil fumigation.)**
*Ital. agric.*, 1959, **96**: 143-6, bibl. 17, illus.

Work recently published in California [see preceding abstract] is discussed. *Xiphinema index* and *Criconemoides* sp. were found in Italian vineyard soils, in which vine roots were affected with the disease known as arriciamento [curling]. Other nematode genera present were *Helicotylenchus*, *Paratylenchus* and *Rotylenchulus*. The indications were that, in the vineyards represented, there were two levels of disease, at the higher of which all the damage caused by the various parasitic nematodes present culminated in infectious degeneration, some of these nematodes being actual vectors.

2284. Neri, G.
Su una anomalia del grappolo di vite Chiavennasca e Brugnola. **(An anomaly of grape bunches in the vine varieties Chiavannasca and Brugnola.)**
*Riv. Vitic. Enol.*, 1959, **12**: 80-2, bibl. 3, illus.

In 2 vineyards affected by infectious degeneration a completely new symptom appeared in these 2 varieties. Some of the fruit bunches were normal, but others, even on the same shoot, were diminutive in every respect.

### *Bacteria.*

(*See also* 2196, 2366b, v, 2373.)

2285. Riker, A. J., Berbee, J. G., and Smalley, E. B.
**Effects of crown gall and hairy root on the growth of apple trees.**
*Phytopathology*, 1959, **49**: 88-90, bibl. 6, illus.

Yellow Transparent nursery apple trees were inoculated with crown gall or hairy root bacteria and planted in an orchard with healthy controls. Trees infected by crown gall were not significantly smaller than the uninfected trees. Hairy-root-infected trees were smaller than the others after 6 years, and also were smaller after 25 years. Many of the original lesions were covered with healing callus. No definite evidence was found of heart rot developing from the original lesions. [Authors' summary.]—Univ. Wis., Madison.

2286. Behr, L.

Ein Beitrag zur Frage der wirtschaftlichen Bedeutung des Wurzelkropferregers *Agrobacterium* (*Pseudomonas*) *tumefaciens* (Sm. et Towns.) Conn. für Unterlagenbaumschulen. **(On the economic importance of crown gall in rootstock nurseries.)** [Russian and English summaries 12 lines each.]

*Arch. Gartenb.*, 1958, **6**: 445-59, bibl. 39, illus.

Crown gall of fruit trees causes great losses in Germany, especially in rootstock nurseries. Experiments with M.XI and pear seedlings showed that healthy plants are infected rapidly and extensively, if grown together with diseased rootstocks. The surgical removal of tumours did not constitute a cure, as the roots continued to form new tumours. While control of the disease was impossible, a prophylactic measure greatly reduced the percentage of infected plants, namely the immersion of the pruned roots in a slurry containing 1% Ceresan U564 7–14 days before planting.—Phytopath. Inst., Martin-Luther-Univ., Halle-Wittenberg.

2287. Crosse, J. E., and Bennett, M.

**The effects of cotton seed oil on the control of bacterial canker of cherry with an early autumn spray schedule of bordeaux mixture.**

*A.R. E. Malling Res. Stat. 1958*, 1959, **A42**: 93-5, bibl. 5.

Three applications of bordeaux mixture applied on 19 August (2–3–100), 18 September (4–6–100), and 15 October (10–15–100) reduced the incidence of bacterial canker infections [*Pseudomonas mors-prunorum*] on cherry by more than 90%. Cotton seed oil prevented rapid defoliation by these sprays but had no apparent effect on the disease, either separately or in combination with bordeaux mixture. [Authors' summary.]

2288. Miller, P. W.

**A preliminary report on the comparative efficacy of copper-lime and Agri-mycin dust mixtures for the control of walnut blight in Oregon.**

*Plant Dis. Reptr*, 1959, **43**: 401-2, bibl. 4.

In 1957 an Agri-mycin–copper dust mixture, while causing some foliage injury, gave as good control as a copper–lime dust mixture, and better control than Agri-mycin dust alone. In 1958 the Agri-mycin–copper dust was better than the copper–lime dust and caused no visible foliage injury. It is also cheaper. [For earlier work see *H.A.*, 28: 2350.]

### *Fungi.*

(*See also* 2363, 2366a, j, m, n, u, 2367k, l.)

2289. Edney, K. L.

**Observations on the infection of Cox's Orange Pippin apples by *Gloeosporium perennans* Zeller and Childs.**

*Ann. appl. Biol.*, 1958, **46**: 622-9, bibl. 8, illus.

Fruit infected in August and September rots at a greater rate than fruit infected in June and July of the same year. In years when susceptibility to rotting is high, infections initiated in July may develop more rapidly than those initiated later in the season in a year when susceptibility to rotting is relatively low. The rate of rotting has been found to increase with the size of the fruit. [From author's summary.] The penetration of the fruit epidermis by the fungus is described.—D.S.I.R., Ditton Lab., Maidstone.

2290. Moore, M. H., and Edney, K. L.

**The timing of spray treatments for the control of storage rot of apple caused by *Gloeosporium* spp.**

*A.R. E. Malling Res. Stat. 1958*, 1959, **A42**: 106-9, bibl. 16.

Captan sprays were applied at 0·1% active ingredient to Cox's Orange Pippin trees in 1955 and 1956. Four spray schedules were compared: (1) July, Aug., Sept., (2) Aug., Sept., (3) Sept. only, and (4) no spray treatment. The fruit was subsequently stored at 37° F., and rotting caused by *G. perennans* and *G. album* recorded on 4 occasions during the winter. In both years the mid-Sept. application caused a significant reduction in rotting. In 1955, in which year the summer was relatively dry, the mid-July, but not the mid-August, spray augmented control, but in the wetter summer of 1956 the mid-August spray improved control. The results suggest that in periods of unsettled weather a reduction in the interval between spray applications might provide more effective control.

2291. Montgomery, H. B. S.

**Storage conditions in relation to *Gloeosporium* rots.**

*A.R. E. Malling Res. Stat. 1958*, 1959, **A42**: 140-1.

The percentage wastage in samples of Cox's Orange Pippin apples due to *Gloeosporium* spp. was found to be lower in some commercially grown samples after 18 weeks gas storage than after 14 weeks cold storage. In these samples the predominant species was *G. album*, whereas *G. perennans* was predominant in samples where the rotting was greater after gas storage. It is suggested that strict orchard hygiene combined with gas storage may aid in controlling both species. [Author's summary; see also *H.A.*, 29: 253.]

2292. Foschi, S.

Prove di lotta contro l'oidio del melo. **(Experiments on the control of *Oidium* on apples.)**

*Frutticoltura*, 1959, **21**: 177-81, illus.

Trees of the varieties Jonathan and Imperatore were almost destroyed, and those of the normally resistant varieties Stayman (Red and Black), Delicious and Democrat were heavily attacked, by *Oidium farinosum* [*Podosphaera leucotricha*] after 4 years' anti-scab treatment with zineb or similar dithiocarbamates. In the 2 following years, early infection was only moderately controlled by either wettable sulphur at 0·3% or karathane at 0·06–0·1%, but later in the season 0·09% karathane was distinctly more effective than the sulphur. When karathane was used at 0·1% in the first, and at 0·06% in the second, year, the results were better than with 2 years' use of sulphur. Karathane was significantly more effective at 0·09% than at 0·06%. In the second year, the action of both products was more effective where karathane, rather than sulphur, had been used the previous year.

2293. Moore, M. H., and Bennett, M.
**The influence of early spring sprays on the incidence of apple mildew.**
*A.R. E. Malling Res. Stat. 1958*, 1959, **A42**: 103-5, bibl.2.

When the same plots of unworked M.III rootstocks were sprayed in 5 successive years at bud-swelling or bud-burst with an emulsion concentrate of DNC-petroleum oil, diluted to give a spray containing 0·1% DNC and 2·9% oil, there was a significant reduction in the amount of overwintered mildew (*Podosphaera leucotricha*) found on shoots that developed subsequently. Lime-sulphur at 2·5% applied at the same time only reduced infection in the 5th year and then only to a much smaller extent. Neither treatment had any effect on apple scab, but lime-sulphur applied at the green-cluster stage reduced infection slightly.

2294. Müller, R.
Untersuchungen über die Biologie und Bekämpfung des Apfelmehltaues *Podosphaera leucotricha* (Ell. et Ev.) Salm. **(Studies on the biology and control of apple mildew.)**
*Thesis, Hohenheim*, 1957, pp. 77, illus., from abstr. in *Z. PflKrankh.*, 1959, **66**: 105.

Control of conidial infection was obtained by a series of wettable sulphur or karathane sprays, a reduction in surface tension enhancing the effect of sulphur. Periods of susceptibility and other biological data are recorded.

2295. Nienhaus, F.
Über die chemische Bekämpfung von *Phytophthora cactorum*, dem Erreger der Kragenfäule an Apfelbäumen. (**Chemical control of *Phytophthora cactorum*, causing collar rot of apple trees.**) [English summary ½ p.]
*Phytopath. Z.*, 1959, **34**: 365-84, bibl. 12, illus.

New methods of determining the resistance of fungicides to rain and of estimating spore germination of *P. cactorum* were developed. Several copper oxychloride compounds tested did not give adequate protection of the trees against infection, and the addition of a spreader did not improve them. One mercury formulation (Phytocactan) and a copper preparation (Pomophylam), applied as pastes to the trunk, were effective against collar rot. Results of chemical soil sterilization and of the chemotherapeutic treatment of diseased trees were negative.—Inst. PflKrankh., Univ. Bonn.

2296. Stojanović, D.
Prilog proučavanju biologije i mogućnosti suzbijanja *Venturia inaequalis* (Cke) Wint. **(A study of the biology and the possibility of control of *V. inaequalis*.)** [English summary 1 p.]
*Zasht. Bilja*, 1958, No. 45, pp. 3-12, bibl. 12, illus.

The dates of the first ascospore discharge over 4 seasons varied between 20 January and 16 March, and the duration of the infection period from 36 to 117 days. In Central Serbia one pre- and one post-blossom spray of either 1% bordeaux or 40 : 1 lime-sulphur are considered sufficient for complete control.

2297. Tunis, W. D., and Sudds, R. H.
**Field trials with certain *n*-dodecylguanidine fungicides for the control of apple scab,**
*Plant Dis. Reptr*, 1959, **43**: 483-6, bibl. 1.

Data are presented on the performance of Cyprex, used in 1957 and 1958, and of E.F.23441 used in 1958 against apple scab. For both materials a dosage rate of ½ in 100 appeared adequate. Fruit injury observed in Cyprex plots in 1957 is thought to have been due to too high a rate associated with low temperatures prevailing at the time of treatment. Cyprex appeared to be compatible with several insecticides. It is recommended for limited trials by growers, but E.F.23441, while promising, needs further testing.—Storrs agric. Exp. Stat., Univ. Conn.

2298. Govi, G., and Bassi, V.
Possibilità di interventi curativi contro la ticchiolatura del melo. (**Possibility of curative treatments for apple scab.**
*Frutticoltura*, 1959, **21**: 143-52, illus.

Complete control of leaf infection was given by 0·15% mercury phenylbenzocatechin, applied within 48 hrs of the commencement of infecting rain. Phenylmercuric naphthenate at the same concentration was almost as effective. Other organic mercury compounds gave good results, all being better than 0·25% TMTD and much better than 0·3% captan and 0·8% bordeaux mixture. In a further experiment, in which each tree was exposed to 2 infecting falls of rain during the growing season, and enclosed in a tent after each, treatment with a phenylmercury compound at 0·08% within ither 48 or 72 hrs of infection gave complete protection from foliar infection.

299. CASARINI, B.
Lotta preventiva contro la ticchiolatura del melo. (**Preventive control of apple scab.**)
*Frutticoltura*, 1959, **21**: 137-42.

praying was carried out 9 times during the rowing season, comparing 8 fungicides. Infection er 10,000 units of leaf surface was 63·38 units in he control, 2·04 with the least effective treatment TMTD at 0·2%) and 0·107 with the most effective opper/calcium oxychloride at 0·3%). The descending order for the other products tested was: etracupric oxychloride 0·25%, bordeaux 0·6%, n organic mercury product 0·1%, captan 0·25%, iram 0·25% and zineb 0·2%. The number of esions per 100 fruits was reduced from 208·4 in the ontrol to 1 by the Cu/Ca oxychloride and to 1·7 by organo-mercury. The descending order of ruit protection for the other products was: etracupric oxychloride, captan, bordeaux, TMTD, ineb and ziram.

300. CASARINI, B.
Il trattamento bleu contro la ticchiolatura del melo. (**Blue treatment for control of apple scab.**)
*Frutticoltura*, 1959, **21**: 153-8.

hree treatments with 0·6% bordeaux mixture efore flowering gave better protection than a blue" treatment (i.e. with 3% bordeaux before ud burst) followed by either 1 or 2 pre-flowering eatments with the 0·6% solution. When a blue" treatment preceded the 3 pre-flowering eatments there was virtually no improvement in ruit protection, and the slight increase in leaf otection was barely significant.

301. COSTA, J. J., CARRERA, C. M., AND RASP, A.
Control de la sarna del manzano (*Venturia inaequalis* Cke. y Wint). (**Control of apple scab (*Venturia inaequalis*).**)
*Rep. III Réun. interamer. Fitogen. Fitopat. Ent. Edafól., Bogotá 1955*, 1958, pp. 257-8.

ery good control, with a yield increase of 21% ver that from traditional [unspecified] methods, was achieved in Buenos Aires province by spraying ith captan at 0·24% or phygon at 0·06%. With mixture of wettable sulphur at 0·4% and either f the above products at half their original concenration, the yield increase was 18%. Spraying the oil, instead of the trees, with any of these solutions, ave an average yield increase of 5%.

302. CATION, D., AND FRIDAY, J.
**Cracking and rot control of sweet cherry.**
*Plant Dis. Reptr*, 1959, **43**: 394-5, bibl. 1.

f 12 treatments applied to Windsor sweet cherries copper–sulphate–lime combination resulted in the east cracking, i.e. 13%. The same combination, and also ferbam–sulphur–glyodin, Acti-dione–glyodin and sulphur–glyodin gave good control of brown rot (*Monilinia* [*Sclerotinia*] *fructicola*). Although the copper-containing spray reduced fruit size and left an objectionable residue, it was the most profitable mixture to use on fruit destined for the processing market.—Mich. agric. Exp. Stat., E. Lansing.

2303. ERCOLANI, G. L.
La ticchiolatura del nespolo del Giappone. (**Scab on loquat.**)
*Inf. fitopat.*, 1959, **9**: 22-3, illus.

The organism concerned is *Fusicladium eriobotryae*, and the symptoms are similar to those of apple and pear scabs. Some varieties show some degree of resistance, notably the early ones. Bordeaux mixture, at 2% before and at 1% after flowering, and lime-sulphur, with a winter application at 10–12% and later at 6% during the growing season, are recommended for treatment.

2304. FOSCHI, S., LENZI, G., AND SANSAVINI, S.
Prove di lotta antiparassitaria contro la "bolla" e il "corineo" del pesco. (**Trials on the control of leaf curl (*Taphrina deformans*) and shot hole (*Clasterosporium carpophilum*) of peach.**)
Reprinted from *Progresso agric.*, 1958, Vol. **4**, No. 6, pp. 23, illus.

Trials were made at 3 centres in Italy, one of them Bologna, in 1957, a year particularly favourable to attacks of the diseases in question. Materials tried were 3% bordeaux, 5% polysulphide of barium, 0·6% and 0·9% zineb, 0·9% captan, 0·45% TMTD [thiram], and 0·45% ziram. Results indicate that for the combined control of both diseases bordeaux mixture remains supreme, its effects being equalled, however, by those of thiram. Ziram proved as good as thiram against shot hole. The effects of captan were intermediate between those of zineb and polysulphide of barium, which were found comparatively ineffective. Zineb at 0·6% was considerably less effective than zineb at 0·9%.

2305. CHAFFARD, M., MOUTERDE, M., AND THIOLLIÈRE, J.
La cloque de pêcher. (**Peach leaf curl.**)
*Pomol. franç.*, 1959, No. 1, pp. 5-10, illus.

Applications of ziram in early December and/or mid-February gave control of peach leaf curl on J. H. Hale. An application in late March was less effective. Control by ziram was better than by copper sprays.

2306. LENZI, G.
La ticchiolatura del pero. (**Pear scab.**)
*Frutticoltura*, 1959, **21**: 183-90, illus.

Pear trees of the variety Santa Maria, treated in October and March with either 1% DNOC or an organic mercury product at 0·25%, had respectively 1·45 and 2·2% of the fruit surface affected by scab, compared with 2·45% after treatments with 2% bordeaux, 2·9% after 0·6% ziram, 4·8% after 0·6% captan, each used 3 times (October, December and January), and 6·18% without fungicidal treatment.

2307. van Marle, G. S.
De invloed van enige schurftbestrijdingsmiddelen op peren. (**The effect of some scab control materials on pears.**)
*Fruitteelt*, 1959, **49**: 174.

TMTD gave the most satisfactory results of 8 treatments tested, in spite of a certain amount of russeting on Triomphe de Vienne and Conference. Wettable sulphur gave the poorest results and had an unfavourable effect on fruit size. Ziram and zineb were both useful, but it was preferable to continue with TMTD during the season.

2308. Barnes, G. L.
**Effectiveness of certain protectant fungicides for controlling pecan scab during a severe scab season in Oklahoma.**
*Plant Dis. Reptr*, 1959, **43**: 487-90, bibl. 19.

Four spray materials were tested on Squirrel pecan trees for the control of *Fusicladium effusum* on foliage and nuts during the severe scab season of 1958. Dyrene and zineb provided excellent control, maneb gave poor control, and ziram was relatively ineffective. The weight of nuts increased proportionately with the number of applications of ziram in a spray-omission test on Western trees. [From author's summary.]

2309. Casarini, B.
A che punto è la lotta antibotritica. (**The present position with regard to *Botrytis* control.**)
*Frutticoltura*, 1959, **21**: 31-40, illus.

In experiments in strawberry beds TMTD and captan, at 0·3%, gave better results than zineb against *Botrytis cinerea*. Copper oxychloride gave poor control. In general, TMTD was slightly more effective than captan, reducing infections of the order of 20% to approximately 4%, and heavy infections of more than 50% by at least half. For satisfactory results 6–8 treatments are necessary, from the beginning of flowering to the completion of harvesting, each involving 30 hl. per ha.

2310. Janick, J., and Williams, E. B.
**Resistance of strawberry varieties and selections to leaf spot and scorch.**
*Plant Dis. Reptr*, 1959, **43**: 413-15, bibl. 5.

Of 41 varieties and selections sampled for incidence of leaf spot (*Mycosphaerella fragariae*) and leaf scorch (*Diplocarpon earliana*), Aroma, British [?Royal] Sovereign, Catskill, Crimson Flash, Empire, Fairfax and Midland showed the most resistance.—Purdue Univ.

2311. Fulton, R. H.
**Spread of strawberry red stele root rot, *Phytophthora fragariae,* by resistant varieties and the survival period of the organism.**
*Plant Dis. Reptr*, 1959, **43**: 270-1.

Strawberry varieties resistant to red core were shown to transmit the disease to a susceptible variety when transplanted with it into sterilized soil. It is not known whether infection occurred through soil particles adhering to the roots or from lightly-infected roots. Re-infection of strawberry plants occurred in loam soils after rest periods of 4 to 13 years.—Mich. St. Univ., E. Lansing.

2312. Casarini, B.
Prove di lotta antiperonosporica. (**Results of tests against downy mildew of the vine.**)
*Progresso agric.*, 1958, **4**: 1223-33, illus.

Reports are made of trials at 6 centres in Northern Italy on the use of different substances to control downy mildew of vines. Among substances tested were bordeaux, zineb, maneb, captan and various mixtures or variants of these and other substances. Results are indicative rather than conclusive. Whereas zineb in some of its forms and mixtures was found generally successful, it had no effect on oidium. Captan gave similar results to zineb, and in addition it appeared to favour the growth of the vines, though it led to yellowing of the foliage when long periods of hot weather occurred. Effects varied somewhat at the different centres.

2313. Falchieri, F.
Impostazione delle prove antioidiche rilievi ed elaborazione dei risultati. (**The establishment of tests for the control of vine powdery mildew [*Uncinula necator*] and the interpretation of results.**)
Foschi, S.
Prove di lotta contro l'oidio della vite. (**Tests for the control of vine powdery mildew.**)
*Progresso agric.*, 1958, **4**: 905-11, illus and 912-19, illus.

In the first of these papers the author explains where and with what materials trials on the control of vine powdery mildew should be carried out and the sort of questions which it is useful to answer. The author of the second paper discusses the carrying out of such trials at 3 centres and considers the research data evolved. Results are scarcely crystal clear, but indicate that bordeaux probably remains the best remedy, especially when aided by such additions as karathane and sulphur in wettable or dust form; that maneb may be better than zineb alone; and that ziram plus sulphur may be better than zineb plus sulphur.

2314. CASARINI, B.

Prove di lotta antioidica. Epoche dei trattamenti. **(Tests of optimum timing in the control of vine powdery mildew.)**

Reprinted from *Progresso agric.*, 1958, Vol. **4,** No. 5, pp. 11, illus.

Common belief stresses the importance of early treatment to prevent the worst ravages of vine powdery mildew, and this appears to be substantiated by experiments at 3 centres discussed here. The most striking feature of the results of these 1957 trials is the considerable protective efficacy of treatments carried out long before the first visible symptoms of the disease become apparent. Thus at one centre the addition of wettable sulphur to the first 5 anti-downy mildew treatments resulted in considerably lower powdery mildew incidence by the end of June than that noticeable where similar treatment had been given only just before the appearance of powdery mildew symptoms. As a protectant added to the downy mildew spray, karathane proved better, and flowers of sulphur worse, than wettable sulphur. On the other hand, during the heat of summer, flowers of sulphur proved better than wettable sulphur or karathane.

2315. CASARINI, B., AND ROSSINI, P.

Prove di lotta contro l'oidio della vite. **(Experiments on control of powdery mildew of vines.)**

*Frutticoltura*, 1959, **21**: 201-9, bibl. 1, illus.

Single fungicides and mixtures were compared in 2 localities, the applications beginning in mid-May. In the first series (6 applications ending in early August) fruit infection reached 20·2% following 1% bordeaux. The effectiveness of 0·25% zineb was significantly lower, and that of 0·5% Solvitene (dithiocarbamate+sulphur) slightly higher. Much better control resulted from mixtures of (1) 0·25% zineb and 0·3% sulphur, and (2) 17 parts zineb to 83 karathane, used at 0·35% with a wetting agent; infection was reduced to 3·9 and 2·8% respectively. The most effective treatments were 0·25% zineb+0·1% karathane (infection below 1%) and 0·25% zineb followed 12 hrs later by a sulphur dust (infection below 0·5%). In the second series there were 8 applications ending in late July, and some of the treatments were modified, zineb being used always at 0·3%. Here again the best results were from zineb followed by sulphur dust (infection 0·137%). Other treatments reducing infection below 0·5% were: 1% bordeaux+0·1% karathane; 0·3% zineb+0·1% karathane; 0·3% zineb+0·2% Thiamon; 1% bordeaux+0·2% Thiamon. With zineb alone, however, 31·275% infection was recorded.

2316. BERRY, F. H.

**Walnut anthracnose—its cause and control.**

*48th A.R. north. Nut Grs' Ass. 1957*, Mansfield, Ohio, pp. 16-23, illus.

Anthracnose or leaf blotch, caused by *Gnomonia leptostyla*, is a widespread and destructive disease of certain walnut species, in particular the eastern black walnut. Rainfall and low temperature favour its development. Of black walnut varieties grown at Beltsville 16 were found to be resistant to the disease and 16 susceptible. Experiments have shown that 4 applications of a fungicide such as Dithane Z-78 or low lime bordeaux give good control even when climatic conditions are favourable for the spread of the disease. Work is in progress to determine the smallest number of applications necessary under different environmental conditions.

## *Nematodes.*

(*See also* 2095, 2262, 2282, 2283, 2366z, 2367a, 2373.)

2317. BOSHER, J. E.

**Fruit trees suffer from nematode work.**

*Bett. Fruit*, 1959, **53** (7): 6, 18-19, bibl. 15.

Surveys in British Columbia have shown that almost 75% of clonal apple stocks carried *Pratylenchus penetrans*, compared with 23% of seedling stocks. The hot-water treatment at present recommended for clonal maiden apple stocks is a 2-hour pre-soak in tap water, with a 30-minute treatment at 115–116° F., followed immediately by cooling in tap water and a dip in 0·5% Tersan. Slightly longer hot-water treatment is possible for older stocks. Autumn row fumigation with liquid Nemagon also gave excellent initial control of *P. penetrans*, but there was some reinfestation from untreated inter-rows after winter rains. Nemagon granular 10% applied at 250 lb./acre to clonal beds in April resulted in a significant reduction in nematode infestation in maiden stocks cut from the stools in November.—Canada Dep. Agric., Saanichton, B.C.

2318. HELTON, A. W.

**Orchard test results are negative.**

*Bett. Fruit*, 1959, **53** (7): 10, 17.

Populations of parasitic nematodes in an old cherry soil were reduced by soil fumigation, but the growth of apple trees planted after the treatment was the same in fumigated and control plots. —Univ. Idaho, Moscow.

2319. ORCHARD, W. R.

**Strawberry plants hit by attack of nematode.**

*Bett. Fruit*, 1959, **53** (7): 5, 20-2, bibl. 24.

At Saanichton autumn fumigation of soils is more effective than spring fumigation with standard pre-planting treatments. Row fumigation with Nemagon was not entirely satisfactory owing to reinfestation from the untreated inter-row areas.—Canada Dep. Agric., Saanichton, B.C.

2320. Schwartze, C. D.
**Strawberry crop gains from nematode control.**
*Bett. Fruit*, 1959, **53** (7): 9-10, 20.

Of 10 fumigants applied in the autumn before a spring planting of strawberries, Telone and Fumazone (Nemagon Soil Fumigant) resulted in increased berry yields with little or no growth stimulation. Costs per acre with these 2 compounds were the lowest of those tested. With some fumigants growth was stimulated without any yield increase.—W. Wash. Exp. Stat., Puyallup.

2321. Lear, B., and Lider, L. A.
**Eradication of root-knot nematodes from grapevine rootings by hot water.**
*Plant Dis. Reptr*, 1959, **43**: 314-17, bibl. 3.

Rooted vine cuttings were completely freed of *Meloidogyne incognita acrita* and *M. javanica javanica* by hot-water treatments at 118° F. for 30 min., 120° for 10 min., 125° for 5 min., or 127° for 3 min. No injury was observed from these treatments on 16 commercial varieties and 4 experimental selections.—Univ. Calif., Davis.

### *Mites.*

(*See also* 2330, 2335, 2341, 2360, 2363, 2366r, x, 2367d, i.)

2322. Collyer, E., and Kirby, A. H. M.
**The problem of acaricide-tolerant strains of the fruit tree red spider mite, *Metatetranychus ulmi* (Koch) in south-east England.**
*A.R. E. Malling Res. Stat. 1958*, 1959, **A42**: 131-9, bibl. 15.

Satisfactory control of the fruit tree red spider mite, *Metatetranychus* [*Panonychus*] *ulmi*, was obtained in an Essex orchard in 1954 and 1955 with two post-blossom applications of either chlorfenson or chlorbenside. A single pink-bud application of chlorfenson at a heavier rate was ineffective in 1955. Following routine applications of chlorbenside in the same orchard in 1956 and 1957, a heavy winter egg population was present in 1957-8. Chlorbenside applied post blossom in 1958 failed to kill summer eggs or larvae, or to affect the production or viability of summer eggs laid by sprayed female mites. Chemical determination showed that chlorbenside was deposited and weathered in a normal manner on leaves from experimental plots, and laboratory tests showed that eggs, laid by female mites taken from trees never sprayed with acaricides, largely failed to hatch. In contrast to the 1958 result with chlorbenside, excellent control was obtained in the same orchard on plots sprayed once in mid-June with the organophosphorus acaricide, amiton. Leaves remained highly toxic to adult female mites and larvae for at least 13 weeks. The conclusions drawn from these trials is that mites now present in this orchard are tolerant of, or resistant to, chlorbenside but not amiton. Judging by experiences in other parts of the world, these mites may well be tolerant of acaricides of the fenson family, and it is to be expected that tolerance to other acaricides, particularly those of the organophosphorus type, might also appear. The problems associated with this phenomenon are briefly discussed. [Authors' summary.]

2323. Reed, W.
**A preliminary study of the toxicity of lime-sulphur and other fungicides to *Psallus ambiguus* (Fall.) (Hemiptera-Heteroptera: Miridae).**
*A.R. E. Malling Res. Stat. 1958*, 1959, **A42**: 127-30, bibl. 5.

*Psallus ambiguus* is an important predator of the fruit tree red spider mite, *Metatetranychus* [*Panonychus*] *ulmi*. Though common in unsprayed orchards, it is rarely found in orchards receiving a full spray programme. Laboratory investigations are described, which show that lime-sulphur is toxic to nymphs of *P. ambiguus* under conditions which favour the evolution of hydrogen sulphide gas. Two other fungicides, captan and dispersible sulphur, were not toxic to *P. ambiguus*.

2324. Breukel, L. M., and Post, A.
**The influence of the manurial treatment of orchards on the population density of *Metatetranychus ulmi* (Koch) (Acari, Tetranychidae).** [German summary ⅓ p.]
*Ent. exp. appl.*, 1959, **2**: 38-47, bibl. 15, illus.

Laboratory experiments showed that a higher egg production per female in 24 hours, a lower mortality rate of the eggs, larvae and nymphs, and a shorter period of development of the male as well as the female mites was obtained on leaves with a high N content. However, these differences were statistically significant only in the case of egg production and mortality rate. From experiments under semi-field conditions it became evident that the egg-female ratio on leaves with high N contents, originating from manured rootstocks, was also significantly higher than this ratio on leaves with a low N content. In both series of experiments the reproduction rate was increased 1·6 times. The experiments confirmed the results obtained earlier from perennial field trials, where an effect of manuring apple trees on the development of *M. ulmi* was found. It is concluded that the mortality of predators of *M. ulmi*, caused by chemical treatment, is not the only reason why the red spider mite populations are stimulated in well kept orchards. [From authors' summary.]—Proefst. Fruitteelt, Wilhelminadorp, Netherlands.

2325. Madsen, H. F., and Bailey, J. B.
**Parathion resistant mites.**
*Calif. Agric.*, 1959, **13** (4): 12.

In an apple orchard where mites were resistant to malathion and parathion, only one of the phosphate treatments applied gave satisfactory mite control; this was Monsanto 10739, and even with this chemical mite populations built up towards the end of the season. Control with Guthion and Karathane was not very satisfactory. Tedion was slow to act, but a single application was effective during the season. *Aphis pomi* was best controlled by 3 treatments with Monsanto 10739. In these trials phosdrin caused severe cracking round the stem-end of Winesap.

2326. MADSEN, H. F.
**New findings on dormant sprays.**
*West. Fruit Gr*, 1959, **13** (1): 17-18, illus.

Trithion and Phostex combined with 2 gal. of dormant oil gave good control of both adults and eggs of pear psylla. There was no difference in ovicidal control of mites on pears by oil-phosphate sprays applied in mid-January and in late February; ethion-oil and Trithion-oil sprays were more effective than Guthion-oil. There are indications that an oil-phosphate spray will control eggs of mites resistant to phosphates. On apples eggs of rosy apple aphids were controlled by 2 gal. of dormant oil plus Trithion, ethion, diazinon or parathion.—Univ. Calif., Berkeley.

2327. MATHYS, G.
L'acariose ou court-noué parasitaire de la vigne (*Phyllocoptes vitis* Nal.). (**Mite infestation or parasitic stunting of vines.**)
*Rev. romande Agric. Vitic.*, 1959, **15**: 21-3, bibl. 5, illus.

In further trials on control of *Phyllocoptes vitis* [for previous work see *H.A.*, 28: 1269], both wettable sulphur (2%) and Basudin emulsion (0·2%), applied at the green tip stage, gave satisfactory control of moderate infestations. Parathion and ecoparathion sprays are not recommended because of their severe effect on natural predators.

### *Insect pests.*

(*See also* 2094, 2196, 2198, 2325, 2326, 2359, 2360, 2363, 2366d, g, w, 2367d, g, m, 2373, 2430.)

2328. MILLIRON, H. E.
**Economic insect and allied pests of Delaware.**
*Bull. Del. agric. Exp. Stat.* **321**, 1958, pp. 87+xvi.

The author does not deal with the control of the pests described, nor does he try to cope with the pest problems which confront the grower or nurseryman. He does, however, give factual accounts under the crop plant concerned of the individual pests, their seasonal occurrence, destructive stages and host plants so far as they concern the crop in question. Such crops include the main temperate top fruits, except pears, and the main vegetables, also strawberries but not raspberries or currants. Further, he discusses the ecological factors and agricultural practices which influence pest incidence and briefly deals with factors which may instigate an unusual occurrence or abundance of particular pests.

2329. BREMER, H.
Versuche zur Abschreckung von Blattläusen. (**Experiments on repellents for aphids.**)
Reprinted from *Anz. Schädlingsk.*, 1959, **32**: 17-18, bibl. 4.

Experiments were conducted to protect a variety of horticultural crops from colonization by virus-transmitting aphids, especially *Aphis fabae* and *Myzus persicae*. Sap from plants which are not hosts of these aphids did not repel the aphids, but dusting, e.g. with carborundum dust, had a clearly repellent effect.—Inst. Gemüseb. u. Unkrautforsch., Neuss-Lauvenburg [now at Fischenich, Kr. Köln].

2330. WARREN, F. W., III, AND KING, D. R.
**The biotic effect of insecticides on populations of aphids and mites of pecans.**
*J. econ. Ent.*, 1959, **52**: 163-5, bibl. 7.

In an experiment to determine the factors which contribute to increases in aphid and mite populations on pecans following the use of certain insecticides, predators were found to be present in equal numbers on both sprayed and unsprayed trees. Tests were performed to determine whether DDT increased the reproductive rate of the black-margined aphid, *Monellia costalis*, and the black pecan aphid, *Melanocallis caryaefoliae*. No aphids survived on treated leaves until the residue diminished. After this period, populations were comparable on sprayed and unsprayed leaves, indicating that stimulation by DDT was not a significant factor. Mechanical factors, such as leaf pubescence and surface residues, appeared to be significant influences on the development of aphid and mite (*Tetranychus hicoriae*) infestations following the use of certain insecticides. [From authors' abstract.]—Tex. agric. exp. Stat., College Station.

2331. MADSEN, H. F., AND MCNELLY, L. B.
**Mealybug on apricot.**
*Calif. Agric.*, 1959, **13** (2): 13-14, illus.

Preliminary trials on the control of grape mealybug (*Pseudococcus maritimus*) on apricots showed that, in general, petal fall sprays of organic phosphorus compounds were more effective than autumn or winter applications of organic P compounds plus oil. Parathion and diazinon were the most effective of the materials tested.

2332. SZWEDA, M.
Obserwacje biologiczne i doświadczenia nad zwalczaniem kwieciaka jabłkowca (*Anthonomus pomorum* L.) preparatami zawierającymi HCH zastosowanymi po złożeniu jaj. (**Investigations on the control of apple blossom weevil by BHC applied after oviposition.**) [Russian and English summaries 1 p. each.]
*Prace Inst. Sadown. Skierniewice*, 1958, **3**: 177-96, bibl. 14.

Azotox emulsion (DDT) used at 0·125% gave poor control of adult weevils. A mixture of Krezotol (50% Na salt of DNOC) and Azotox (0·25%) was very effective when applied at bud burst. The application of BHC (Hexitol 0·4%) at pink bud gave better control than the Krezotol plus Azotox mixture on *Malus prunifolia*, although results with Antonovka were less good. BHC was effective against both eggs and larvae.

2333. Cram, W. T., and Andison, H.
**Soil insecticides for control of root weevils in strawberries in British Columbia.**
*Canad. J. Plant Sci.*, 1959, **39**: 86-91, bibl. 5.

The following treatments gave satisfactory protection from the black vine weevil, *Brachyrhinus sulcatus*, and the strawberry root weevil, *B. ovatus*, for the 3½-year life of the strawberry planting: a pre-planting soil dusting of aldrin at 5 lb., dieldrin at 3 lb. or chlordane at 10 lb. toxicant per acre, combined with a dust application to the transplant roots at 5 lb. per 10,000 plants of 2½% aldrin, 1½% dieldrin or 5% chlordane. Foliage applications were not necessary following soil and root treatments. Third-year yields from the treated plots averaged 2·8 tons per acre, an increase of 1·7 tons per acre over the control plots. Treatments were not effective against *Sciopithes obscurus* or *Nemocestes* spp.—Canada Dep. Agric., Victoria, B.C.

2334. Eide, P. M.
**Soil fumigation to control weevil grubs in strawberries.**
*J. econ. Ent.*, 1959, **52**: 3-5, bibl. 3.

Ethylene dibromide was a practical fumigant against *Nemocestes* (*Geoderces*) *incomptus*, *Sciopithes obscurus*, *Brachyrhinus sulcatus* and *B. ovatus* in strawberries at dosages as low as 1·6 gal. per acre applied only to the rows. A dosage of 8·6 gal. did not injure the plants. A mechanical applicator which applied any desired amount of insecticide uniformly without appreciable injury to the plants was devised. Nemagon, applied with a hand injector, was not successful in these tests, nor was Dipterex when used as a drench. Strawberry plants were killed by Vapam when applied as a drench. [From author's summary.]—N.W. Wash. Exp. Stat., Mount Vernon.

2335. Johnson, W. T.
**Chestnut insects and their control.**
*48th A.R. north. Nut Grs' Ass. 1957*, Mansfield, Ohio, pp. 51-8.

Ground cover treatment with aldrin or heptachlor sprays or heptachlor dust, all at 6 lb./ac., gave very good control of large and small chestnut weevils (*Curculio proboscideus* and *C. auriger*) [see also *H.A.*, 28: 317]. Notes are also given on other pests and their control, including *Cyrtepistomus castaneus*, *Popillia japonica* and the mite *Oligonychus bicolor*.—Univ. Md.

2336. Sidor, Ć., and Jovanović, M.
*Otiorrhynchus lavandus* Germ. štetočina fruškogorskih vinograda. (***O. lavandus*, a vineyard pest in the Fruška Gora region.**) [English summary 1 p.]
*Zasht. Bilja*, 1957, No. 44, pp. 73-82, bibl. 5.

This weevil was observed in 1956 and 1957 not only on vines but also on a number of common weeds, shrubs and fruit trees. Its life history and morphology are described. Among various control measures tried, satisfactory results were obtained in the summer with Diditin (25% DDT) and Perfectan-Streukonzentrat (15% lindane) and in the autumn with lead arsenate. As a soil treatment in the spring Diliden (4·65% techn. DDT plus 0·75% lindane) dust at 35 kg./ac. was more effective than Zoralin spray at 0·4%.

2337. Lazarević, B.
Jabukin svrdlaš. (***Rhynchites bacchus*.**) [English summary 2½ pp.]
*Zasht. Bilja*, 1957, No. 43, pp. 29-53, bibl. 11, illus.

A detailed description is given of the biology of this pest and the damage it causes on apple, apricot, peach, plum and cherry trees. For control pre- or post-blossom spraying with lindane, DDT or parathion is recommended.

2338. Brizzi, G.
Osservazioni sulla etologia del *Sinoxylon perforans* (Schrank). (Coleoptera, Bostrychidae.) (**Observations on the etiology of *Sinoxylon perforans*.**)
*Riv. Vitic. Enol.*, 1959, **12**: 83-5, 124-32, bibl. 21, illus.

It is now known that the adult beetles, and not the larvae, are the main cause of damage to vines in the growing season. Prunings in affected vineyards should be destroyed in May, June and July, or covered with a layer of insecticide from early April to mid-May. Heptachlor or dieldrin are recommended.

2339. Vereščagin, B. V., and Vereščagina, V. V.
***Ceresa bubalus* injurious to orchards in the southern Dniester district.** [Russian.]
*Ent. Obozrenie*, 1956, **35**: 822-5, from *Ref. Ž.* (*Biol.*), 1958, No. 5, Abstr. 21,088.

The females of *C. bubalus* cut slits in branches in which to deposit their eggs. The slits, 4–5 mm. long, affect both cambium and wood, the bark peels, and in cases of severe attack the branches dry up in the following spring. Apple, pear, plum, apricot, cherry and some other species proved susceptible, particularly in damp orchards in river valleys. In addition to precautionary measures spraying against the larvae with a 4% suspension of DDT or BHC, or a 4% emulsion of Wofatox is recommended.

2340. Nikolić, D.
Klimatske prilike i pojava jabučnog smotavca u Tetovu u toku petogodišnjeg perioda (1952-1956). **(Climatic conditions and the appearance of codling moth at Tetovo during the 5-year period 1952-1956.)** [French summary ½ p.]
*Zasht. Bilja*, 1958, No. 45, pp. 67-74, bibl. 5.

The effects of temperature on the start and progress of apple codling moth emergence are discussed. On the basis of data given it is recommended that spraying should be carried out on 15 to 25 May, 8 to 15 June and 20 to 30 June.

2341. Michelbacher, A. E., and Gonzales, C. Q.
**Codling moth investigations [in walnut orchards].**
*Calif. Agric.*, 1959, **13** (4): 11, 14.

In many parts of northern California a single, well-timed application of DDT 50% w.p. at 8 lb. per acre gave adequate control for a season; in some areas this treatment was inadequate, probably due to the development of a strain of codling moth resistant to DDT. Both Guthion and Sevin gave promising control with 2 applications; Guthion, at 1 lb. of 25% w.p. per acre each time, tended to give better control than DDT and also suppressed spider mites and walnut aphid. Sevin tended to suppress walnut aphid, but favoured an increase in spider mite population. Trithion alone did not give adequate control of codling moth, but, when it was combined with DDT, control was improved. High concentrations of ethion gave promising control of codling moth, but did not equal the control obtained with DDT. Control with Delnav was not satisfactory.

2342. Imbert, L., Besson, J., and Joly, E.
La tordeuse orientale dans les vergers de poiriers et de pommiers. **(The oriental fruit moth in pear and apple orchards.)**
*Congr. pomol. Oct. 1957, Toulouse*, 1958, pp. 175-91, illus.

After a consideration of the life history of the moth, for which the juxtaposition of peach with pear and apple plantations is necessary, the authors deal with the best methods of control. For direct control the application of DDT or parathion at the moment when the first eggs are being laid on the pome fruits is recommended, oil-parathion having particularly long lasting effects.

2343. Dustan, G. G., and Chisholm, D.
**DDT residues on peach in Ontario.**
*J. econ. Ent.*, 1959, **52**: 109-10, bibl. 4.

In an experiment on Elberta peach a DDT residue approximately 30% below the official tolerance of 7 p.p.m. was left on the fruit at harvest by the spray schedule recommended for control of the oriental fruit moth (*Grapholitha molesta*), namely, 2 lb. of 50% wettable powder per 100 imp. gal. on 4 and 15 July and 1 lb. on 22 August, 25 days before harvest. Approximately 4·5 gal. per tree per application were applied. The tolerance was exceeded when three earlier sprays (27 May, 5 and 17 June) were added to this schedule. The last spray alone (22 August) left a residue on the fruit at harvest of approximately 25% of the official tolerance permitted. [Authors' abstract.]

2344. Chaboussou, F.
Le carpocapse de la prune (*Laspeyresia funebrana* Treit) en Agenais. **(Red plum maggot and its control in the district of Agen.)**
*Congr. pomol. Oct. 1957, Toulouse*, 1958, pp. 77-91.

The results of tests with 5 preparations, viz. oil-parathion 3%, oil-parathion 1·5%, parathion wettable powder, Zeidan (DDT 20%) emulsion and malathion emulsion 50%, in 4 different orchards in 2 consecutive years lead the author to the following conclusions. Attacks are to be expected when the average shade temperature from April to June inclusive exceeds 16° C. Two consecutive years' trials showed excellent curative results (90–93% success) from the use of oil-parathion at 22–23 g./hl. against the larvae of the 2nd generation which had then penetrated the fruits. This treatment should be given before the total emergence of the 4th generation larvae, or when some 75–80% of the eggs have hatched. The appropriate time lasts about a week.

2345. Vessia, R.
Contributo alla conoscenza della *Celerio lineata* Fabr. var. *livornica* Esp. (Lepidoptera, Sphingidae). **(Contribution to the study of *Celerio lineata* var. *livornica* (Lepidoptera, Sphingidae).)** [English summary ¾ p.]
*Ann. Sper. agrar.*, 1958, Vol. **12**(5): Suppl. pp. lxv-xcvi, bibl. 34, illus.

The larvae of the vine hawkmoth were very satisfactorily controlled by spraying the vines with 0·5% lead arsenate with the addition of lime up to 0·25%. Good results were also obtained by mixing the lead arsenate with bordeaux mixture used for fungicidal treatment. DDT as a wettable powder was somewhat less effective. If weeds, particularly species of *Rumex*, *Gallium*, *Verbascum*, *Antirrhinum* or *Reseda*, are present in the vicinity, they should be sprayed as soon as larvae appear on them to prevent migration to the vines. Gathering the larvae by hand from the vines is practicable; it is a useful supplement to spraying, but needs repetition. Deep cultivation destroys the pupae.

2346. Boyce, H. R.
**Chemical control of the lesser peach tree borer, *Synanthedon pictipes* (G. & R.). (Lepidoptera: Aegeridae), in Essex County, Ontario.**
*Canad. J. Plant Sci.*, 1959, **39**: 75-9, bibl. 2.

Three applications of endrin (totalling 0·9–1·02 lb. of toxicant per acre), or of parathion (0·27–0·31 lb.) plus malathion (1·2–1·32 lb.) gave reasonably consistent reductions in the numbers of borer larvae per tree and of reinfested trees during 1955–57. Similar results were obtained with parathion at 0·55–0·6 lb. per acre in 1956. Dieldrin (used in one season) at 1·03 lb. per acre was less effective than endrin or parathion plus malathion. The first spray should be applied between 5 and 12 days after the last spray for plum curculio, followed by 2 more sprays at 3-week intervals.—Canada Dep. Agric., Harrow, Ont.

2347. Łęski, R., Zawadzka, B., and Szczygieł, A.
Doświadczenia nad zwalczaniem misecznika śliwowego (*Lecanium corni* Bouché) w okresie letnim i zimowym. (**Experiments on the control of brown scale of plums during summer and winter.**) [Russian and English summaries 1 p. each.]
*Prace Inst. Sadown. Skierniewice*, 1958, **3**: 30-50, bibl. 21.

Summer sprays of DDT (up to 1·6%) or BHC (up to 0·8%) were not satisfactory against brown scale of plums. Results with Azotox emulsion (DDT) before bud burst were also unsatisfactory. Winter sprays of 5–8% emulsified tar oil, 0·7–1% Krezotol or 2–3% dinitro–tar oil mixtures caused over 90% mortality of the larvae; there were no significant differences in control between times of winter spraying. Biological studies showed that *Robinia pseudacacia* and *Prunus cerasifera divaricata* were favoured hosts of the brown scale.

2348. Boulanger, L. W., and Wentworth, R. W.
**Dieldrin controls blueberry thrips.**
*Me Fm Res.*, 1959, **6** (4): 3-4, illus.

In 1958 dieldrin dust at 1·5% and dieldrin granular at 1·9% were applied to trial plots on 21 and 25 May at a rate of 0·5 lb. active ingredient per acre. Infestation on 11 Aug. was only 8–11% of that found on untreated plots, and 12–18% of that on plots treated with DDT at 1 lb. actual toxicant per acre. H.L.

2349. Baggiolini, M.
Étude des possibilités de coordination de la lutte chimique et biologique contre *Cacoecia rosana* avec le concours de *Trichogramma cacoeciae*. (**A study of the possibilities of co-ordinating chemical and biological control of *Cacoecia rosana* with the help of *Trichogramma cacoeciae*..**)
Reprinted from *Bull. Soc. ent. suisse*, 1958, **31**: 35-44, bibl. 4, illus.

*Trichogramma cacoeciae*, which is an important parasite of *Cacoecia rosana* in parts of Switzerland, was successfully protected by restricting insecticidal applications on apples to the pre-flowering period, when the parasite is sheltered, and by avoiding applications during its external active phase. Parasitism of the tortricid eggs then rose from 11·8% to 73%.—Stat. féd. Ess. agric., Lausanne.

### *Other pests.*

(*See also* 2366f, l, 2433.)

2350. European and Mediterranean Plant Protection Organisation.
**Report of the International Conference on harmful mammals and their control.** [English and French.]
[*Publ.*] *Eur. Medit. Plant Prot. Org.*, 1959, pp. 75.

Papers were given on the following problems: Comparative efficiency of anti-coagulant rodenticides (6 papers); control of voles (2); forecasting rodent populations (2); control of squirrels (2); and myxomatosis (2).

2351. Storer, T. I.
**Controlling field rodents in California.**
*Circ. Calif. agric. Ext. Serv.* **434,** revised 1958, pp. 50, bibls, illus.

The author deals with ground squirrels, tree squirrels, pocket gophers, field mice, kangaroo rats, musk rats and rabbits, the damage done by them and possible means of control and safety precautions advisable. The chief methods of control, viz. the use of poison baits and gases and trapping are considered at some length. Poison baits include strychnine, zinc phosphide, various anticoagulants such as warfarin, thallium sulphate and Compound 1080, the last two being too dangerous for public use. Gases are sulphur dioxide, carbon disulphide, HCN and methyl bromide. Formulae are given for the various baits, and the methods of applying poisoned baits to underground runs are described with very helpful illustrations. Various repellents are noted as of possible use against moles and rabbits.

2352. Łęski, R., and Szweda, M.
Wyniki pięcioletnich (1950-1955) doświadczeń nad środkami odstraszającymi zające. (**Five years' investigations of chemical repellents for hares.**) [Russian and English summaries 2 pp. each.]
*Prace Inst. Sadown. Skierniewice*, 1958, **3**: 51-82, bibl. 38.

Repellent mixtures containing naphthalene, BHC powder or colophony as the active agent gave similar and adequate protection against hares damaging trees. Recipes are given for the preparation of these mixtures, which should be applied about the beginning of October.

353. Marčenko, D. S.
**The protection of fruit trees from hares and mice.** [Russian.]
*Sad i Ogorod*, 1958, No. 11, p. 56.

Damage was completely prevented when the stems and lower main branches were coated with an aqueous solution containing 15–20 kg. soap, –1·5 kg. copper sulphate, 2 kg. vegetable or 5 kg. petroleum oil, 2 kg. BHC, 10 kg. quicklime and –3 kg. chalk or kaolin per 100 l.

354. Bernard, J.
Essais de lutte contre les rongeurs par arrosage du sol avec un insecticide. **(Experiments on the control of rodents by spraying the soil with an insecticide.)**
*Parasitica*, 1959, **15**: 21-8, bibl. 8.

Endrin, at 2 kg./ha. of a 20% product in 500 l., controlled *Microtus agrestis*, but the experimental use of insecticides against *Arvicola terrestris* yielded less definite results.—Gembloux.

### *Chemicals and their application.*

(*See also* 2093a, k, 2252b, 2343, 2366o, y, 2367b, l. h, 2599z, 2873, 2876-2878, 2945, 2992, 3061, 3077.)

355. Coulson, D. M., Cavanagh, L. A., and Stuart, J.
**Gas chromatography of pesticides.**
*J. agric. Food Chem.*, 1959, **7**: 250-1, bibl. 4.

Between 220° and 280° C., aldrin, dieldrin, *p,p'*-DDT, lindane, parathion, malathion and Systox show suitable behaviour, and the technique may be used for the separation of pesticides in vegetable extracts.—Stanford Res. Inst., Menlo Pk, Calif.

356. Creamer, R. M., and Lamont, T. G.
**Stability of certain insecticides in mixtures with fertilizers.**
*J. agric. Food Chem.*, 1959, **7**: 107-11, bibl. 15.

Most mixtures had good stability for at least month at 30° C. with losses of organic chlorine varying from negligible to more than 50% on ageing for 8 months. At 100° C. nearly all mixtures were unstable and lost approximately 20% of their organic chlorine in the first 24 hours. Instability of insecticides in fertilizer mixtures was related to minor characteristics of the fertilizer, such as iron content and surface acidity. [From authors' abstract.]—U.S.D.A., Beltsville, Md.

2357. Fawcett, C. H., Spencer, D. M., and Wain, R. L.
**Investigations on fungicides. IV. (Aryloxythio)-trichloromethanes.**
*Ann. appl. Biol.*, 1958, **46**: 651-61, bibl. 16, illus.

Twenty (aryloxythio)-trichloromethanes were examined for *in vitro* fungicidal activity against 6 fungi. All compounds showed a direct fungistatic effect and some exhibited a marked fumigant action. Good protectant action against *Alternaria solani* on tomato and *Botrytis fabae* on broad bean was obtained with certain compounds, but none was better than the 3 standard protectants used for comparison. When supplied to plants through their roots, 8 conferred significant systemic fungicidal protection against *A. solani* in tomato, but there was no significant protection against *B. fabae* in broad bean. In preliminary tests the 2: 4: 5-trichlorophenoxythio analogue gave promising results when examined as a fumigant fungicide for eradication of downy mildew in lettuce plants, for reducing lenticel rot in stored apples and for preventing blue-mould in oranges. [From authors' summary.]—Wye Coll., Univ. London.

2358. Coe, D. G., and others.
**Some new organophosphorus compounds with insecticidal properties.**
*J. agric. Food Chem.*, 1959, **7**: 251-5, bibl. 24.

The insecticidal properties of a new series of organophosphorus compounds are described. These substances, which are alkyl *N*-dialkyl alkylphosphonamidates, are readily prepared and have a very low mammalian toxicity. A number of them exhibit a systemic toxicity to aphids comparable to that of octamethyl-pyrophosphoramide. In addition, it has been shown that some dialkyl alkylphosphonates have short term systemic properties, and will also act as cholinesterase inhibitors. Two bis-*N*-dialkyl methylphosphonic diamides were also tested and found to be phytotoxic. [Authors' abstract.] These chemicals were tested on the green peach aphid *Myzus persicae*.—Suffield Exp. Stat., Canad. Defence Res. Bd, Ralston, Alberta.

2359. Enns, W. R.
**Additional report made on effectiveness of insecticide.**
*Bett. Fruit*, 1959, **53** (8): 4, 18.

In an abnormally wet season Diazinon caused 90–95% mortality of codling moth larvae which had already entered the apples. Diazinon was effective for suppressing a build-up of red-banded leafroller, but was not reliable for the control of a heavy infestation. Diazinon also gave good control of cabbage loopers and imported cabbage worms on broccoli and of grape pests.

2360. Unterstenhöfer, G.
**Gusathion, a new polyvalent insecticide and acaricide.**
*Höfchen Briefe* (English edition), 1958, **11**: 81-90, bibl. 9, illus.

The insects and mites known to be susceptible or resistant to Gusathion (0,0-dimethyl-S-(benzaziminomethyl)-dithiophosphate) are listed. In tests ranging over several countries various pests of citrus and of temperate fruits were successfully controlled. In spite of a good residual effect there does not seem to be any residue problem.

2361. CASIDA, J. E., AND AHMED, M. K.
**Mechanism of residue loss of Hercules AC-528 components on plant foliage.**
*J. econ. Ent.*, 1959, **52**: 111-16, bibl. 12.

When only volatilization and hydrolysis were considered, the half life of both the *cis* and *trans* isomers of Hercules AC-528 was 13 days on bean foliage, and that of the dioxene derivative 0·5 days. The persistent insect and mite control by this compound is probably due primarily to the *cis* isomer because of its higher biological activity.—Univ. Wisc., Madison.

2362. HAINES, R. G.
**Controlling fruit insects by aircraft application. I. Apples.**
*Quart. Bull. Mich. agric. Exp. Stat.*, 1958, **41**: 410-20.

Aerial dusting with standard materials on apples appeared to produce a commercially desirable crop. Mite control, however, was not satisfactory owing to poor coverage, especially of the lower leaf surface. This may necessitate supplementary ground sprays, or the use of a systemic acaricide. Timing of aerial dust programmes is critical, as the residual effect is less than with ground spray applications. Both Guthion and Sevin plus Tedion dusts gave promising results.

2363. HEY, G. L., AND HUNNAM, D.
**Aerial spray for fruit: the facts.**
*Grower*, 1959, **51**: 787-9, illus.

Malathion applied at bud burst by fixed wing planes or helicopters gave excellent aphid control on apples. Fruit infection by *Gloeosporium* was reduced by captan, and systemic phosphorus insecticides gave commercial control of red spider. Aerial application of a pre-harvest drop hormone spray was also effective. A suitable spray programme for dessert apples is suggested.—Murphy Chem. Co., Wheathampstead.

### *Phytotoxicity.*

(*See also* 2302, 2325.)

2364. VAN MARLE, G. S.
Verruwing door fosforesters ook op Schone van Boskoop. (**Russeting by organic phosphorus materials on Belle de Boskoop.**)
*Fruitteelt*, 1959, **49**: 205.

Fruit russeting did not occur when a non-phosphorus schedule was applied, but did follow applications of malathion, diazinon, parathion and, to a lesser extent, Systox plus DDT. Trees on M.I were more susceptible to russeting than those on M.II, but not significantly so. In the non-phosphorus plots woolly aphid attack was more severe.—R.T.C., Zutphen.

2365. CASARINI, B.
Tossicità di alcuni antiparassitari sul melo. (**Toxicity of some fungicides to apples.**)
*Frutticoltura*, 1959, **21**: 171-5, illus.

In tests on Delicious the degree of russeting caused by copper-calcium oxychloride was appreciably higher than that from tetracupric oxychloride and much higher than that from bordeaux. An organic mercury product caused a significant, and zineb a non-significant, increase in russeting over untreated controls, values from the copper products being approximately 10–20 times as high. Captan, ziram and TMTD reduced russeting, the last named significantly.

### *Noted.*

2366.

a ADAMS, R. E., AND TAMBURO, S. E.
**Treatment of field boxes for the control of post-harvest rots of peaches and storage rots of apples.**
*Plant Dis. Reptr*, 1959, **43**: 396-400, bibl. 1.
Fungicidal treatment was an effective and practical control measure.

b ANON.
**How to control fire blight on pears, apples and quinces.**
*Circ. Va Polytechnic Inst. agric. Ext. Serv.* **643,** revised 1959, 1 folded sheet.
Removal of cankers and spraying with streptomycin sulphate.

c ATKINSON, J. D., CHAMBERLAIN, E. E., AND HUNTER, J. A.
**Apple rubbery wood in New Zealand.**
*Orchard. N.Z.*, 1959, **32** (1): 2-3, bibl. 5, illus.
Heat treatment (99° F. for 40 days) was ineffective.

d BAGGIOLINI, M.
Les mineuses des arbres fruitiers en Suisse romande. (**Leaf miners of fruit trees in French-speaking Switzerland.**)
*Rev. romande Agric. Vitic.*, 1959, **15**: 17-20, bibl. 5, illus.
Seven species, damage and control.

e BRASE, K. D., AND GILMER, R. M.
**The occurrence of rubbery wood virus of apple in New York.**
*Plant Dis. Reptr*, 1959, **43**: 157-8, bibl. 4.
Reported for the first time in the U.S.A., but incidence only 6%.

f VAN DIJKE, J. F.
Het veldmuizenprobleem en de bestrijding in het gebied van de grote rivieren. (**The problem of the field mouse and its control in the vicinity of large rivers.**)
*Fruitteelt*, 1959, **49**: 212-13.
Endrin was most effective for control of *Microtus arvalis*.

g DORST, H. E.
**Laboratory tests with insecticides against *Drosophila melanogaster.***
*J. econ. Ent.*, 1959, **52**: 172, bibl. 9.
Of 21 materials tested malathion, diazinon, lindane, BHC and heptachlor showed promise for field use.

h ELAM, F. L.
**Fan-blown smudge pots.**
*Amer. Fruit Gr*, 1959, **79** (4): 26, illus.
Spreading warm air into the orchard for frost protection.

i FINK, H. C.
**Indexing sour cherry trees for necrotic-ringspot virus on excised twigs.**
*Phytopathology*, 1959, **49**: 58-9, bibl. 6, illus.
See *H.A.*, 29: 233.

j FOSCHI, S., AND SANSAVINI, S.
Controllo dei limiti termici di attività e del periodo di incubazione, a diverse temperature, del *Coryneum beijerinckii* Oud. (**Determination of temperature limits for activity, and of incubation periods at different temperatures, of *Clasterosporium carpophilum.***)
*Frutticoltura*, 1959, **21**: 191-6, bibl. 5, illus.

k FRANZ, J. M.
**Biological control in Germany.**
*Proc. 10th int. Congr. Ent. 1956*, 1958, **4**: 461-4, bibl. 1.
An outline of work in progress and envisaged.

l GIBAN, J.
L'empoisonnement permanent des rats par appâts aux anticoagulents. (**The poisoning of rats by anticoagulant baits.**)
Les anticoagulents sont-ils utilisables pour la destruction des campagnols et mulots? (**Are anticoagulants suitable for the destruction of voles and field mice?**)
La lutte contre les rats dans les fermes à l'aide des poisons de piste. (**The control of rats on farms by means of trail poisons.**)
*Parasitica*, 1959, **15**: 5-6, 7-9 and 10-14.
Anticoagulants are recommended, with certain qualifications, for rat control but not for voles and field mice.

m GOIDÀNICH, G.
La lotta antiticchiolatura nel quadro generale della difesa antiparassitaria in frutticoltura. (**Scab control in the general framework of protection against diseases and pests in fruit growing.**)
*Frutticoltura*, 1959, **21**: 129-36, bibl. 166, illus.
A review.

n GOVI, G., AND ERCOLANI, G. L.
Aspetti epidemiologici della ticchiolatura del melo. Inoculazioni artificiali di *Venturia inaequalis* (Cke.) Wint. e *Fusicladium dendriticum* (Wallr.) Fck. (**Epidemiological aspects of apple scab. Artificial inoculations of *Venturia inaequalis* and *Fusicladium dendriticum.***)
*Frutticoltura*, 1959, **21**: 159-69, illus.
At different temperatures.

o HARDON, H. J., BRUNINK, H., AND VAN DER POL, E. W.
**The determination of phenkaptone residues in fruit and vegetables.**
*Analyst*, 1959, **84**: 102-5, bibl. 5.
A relatively specific method with a sensitivity of 0·05 p.p.m.

p HOME, SIR J. M.
**Shelter woods or belts.**
*Advis. Leafl. Dep. Agric. Scot.* **5**, 1959, pp. 7, illus.
For Scottish conditions; deals briefly with main practical problems.

q HUGER, A.
Bakterien im Kampf gegen Schadinsekten. (**Bacteria in the struggle against injurious insects.**)
Reprinted from *Umschau*, 1958, **22**: 682-4, bibl. 12, illus.
A review, including notes on their use in controlling lepidopterous pests.

r HURLBUTT, H. W.
**A study of soil-inhabiting mites from Connecticut apple orchards.**
*J. econ. Ent.*, 1958, **51**: 767-72, bibl. 13.
Population data showing the effect of spraying on predatory and other spp.

s JENNY, J.
Quelques notions fondamentales sur les mesures de protection prises contre les gelées. (**Fundamental principles of crop protection against frosts.**)
*Publ. Stats féd. Ess. agric. Lausanne* **577**, 1958, pp. 12, illus.
Studies on temperatures near the soil and on protection by sprinkler irrigation.

t KNOCH, K.
Frostschutz im Weinbau. (**Frost protection in vines.**)
*Techn. Landw.*, 1959, **11**: 5-9, illus.
Sprinkler irrigation and various types of heater.

u KULIKOV, V. A.
**American powdery mildew of gooseberry and its control.** [Russian.]
*S. H. Povolž'ja*, 1957, No. 5, pp. 56-7, from *Ref. Ž.* (*Biol.*), 1958, No. 2, Abstr. 6,482.
By spraying with hot water, up to 80° C., immediately after its appearance on the newly set fruit.

v LELLIOTT, R. A.
**Fire blight of pears in England.**
*Agriculture, Lond.*, 1959, **65**: 564-8, illus.
Outbreaks and the attempt being made to eradicate the disease.

w MASSEE, A. M.
**The effect on the balance of arthropod populations in orchards arising from the unrestricted use of chemicals.**
*Proc. 10th int. Congr. Ent. 1956*, 1958, **3**: 163-8.
Examples given and aims of future research discussed.

x MATHYS, G.
Contribution à la connaissance de la systématique et de la biologie du genre *Bryobia* en Suisse romande. (**A contribution to the study of the morphology and biology of the genus *Bryobia* in French-speaking Switzerland.**) [German and English summaries ¾ p. each.]
Reprinted from *Bull. Soc. ent. suisse*, 1957, **30**: 189-284, bibl. 100, illus.
Predator effects and possibilities of chemical control are also discussed.

y MAUCH, A.
Das Sprühgerät im Obstbau. (**Mist spraying equipment for fruit trees.**)
*Mitt. ObstVersuchsringes Jork*, 1959, **14**: 18-25, illus.
Performance and price of various German machines.

z MEIJNEKE, C. A. R.
**Soil exhaustion in tree nurseries.**
*Span*, 1959, **1** (4): 2-5, bibl. 7, illus.
A brief review, recommending D-D fumigation for nematode control.

2367.

a MYERS, R. F., AND DROPKIN, V. H.
**Impracticability of control of plant parasitic nematodes with ionizing radiations.**
*Plant Dis. Reptr*, 1959, **43**: 311-13, bibl. 6.
Either in soil or on roots of living plants.

b PASTAC, I. A.
Les colorants nitrés et les traitements d'hiver (**Nitro-dyestuffs and winter spraying.**) [English, German and Spanish summaries 12–1 lines.]
Reprinted from *Chim. Ind.*, 1958, **79** 610-14, bibl. 15.
DNC and its derivatives.

c PEYER, E.
Beobachtungen aus der Praxis über di vorzeitige Verfärbung der Reben. (**Observations in vineyards on the premature discoloration of vines.**)
*Schweiz. Z. Obst- u. Weinb.*, 1959, **68** 114-18, illus.
Foliar application of magnesium recommended.

d PHILLIPS, M. A.
**About Megatox, a new systemic non-phosphorus insecticide, based on fluoracetamide.**
*Comm. Gr*, 1959, No. 3302, pp. 963-5, bibl. 8.
Trials against mites and aphids on flowers, vegetables, soft fruits and hops.

e RICHARDS, B. L.
**The leaf spot—leaf mottle complex of the Italian prune.**
*Proc. Utah Acad. Sci., 1957-1958*, **35**: 81-4, bibl. 5, illus.
The two diseases described and compared, and considered to be distinct.

f ROSE, D. K. (DR. AND MRS.).
**Bunch disease of black walnuts.**
*48th A.R. north. Nut Grs' Ass. 1957*, Mansfield, Ohio, pp. 23-7, bibl. 6.
Notes on possible confusion of bunch disease [see *H.A.*, 23: 2811] with overgrowth.

g SĂVESCU, A.
O metodă nouă pentru stabilirea prognozei înmulțirii și avertizarea combaterii păduchelu din San José. (*Quadraspidiotus perniciosus* Comst.). (**A new method of forecasting and warning against San José scale infestation.**) [English, French, Russian and German summaries 1¼ pp.]
*Grăd. Via Liv.*, 1958, **7** (12): 40-3, bibl. 3, a map+summaries.
Based on temperature records.

h SERGEANT, G. A., AND THOMPSON, P. B.
**Modifications to a method for the determination of chlorinated hydrocarbon pesticide residues in plant material.**
*Analyst*, 1959, **84**: 251-3, bibl. 4.
A colorimetric finish, using mercuric thiocyanate, to the method noted in *H.A.*, 28: 3796s.

i SOENEN, I. A., AND VANWETSWINKEL, G.
Avis spécial concernant l'érinose du groseillier à cassis. **(Special information regarding black currant gall mite.)**
*Fruit belge*, 1959, **27**: 10-12.
*Eriophyes ribis* controlled by 2 or 3 sprays of 0·3% endrin.

j SUSZKA, J.
Szkody mrozowe w sadzie pomologicznym w Kórniku powstałe w czasie zimy 1955/56 r. **(Damage caused by frost in the pomological gardens of Kórnik in the winter of 1955/56.)** [English and Russian summaries 2 pp. each.]
*Arbor. Kórnickie, 1957-58*, 1958, **3**: 205-20, bibl. 11.
Varietal susceptibility tabulated for sweet and sour cherries, plums and pears.

k SWALES, J. E.
**Control of brown rot in British Columbia.**
*Hort. Circ. Dep. Agric. B.C.* **80**, [1958 ?], pp. 3.

l TANIĆ, B.
Prilog poznavanju porekla primarnih zaraza rđe šljive. **(A contribution to the knowledge of the primary infection of plum rust (*Tranzschelia pruni-spinosae*.)** [English summary 1 p.]
*Zasht. Bilja*, 1957, No. 43, pp. 97-106, bibl. 4.
Due to aecidiospores which had developed in *Anemone ranunculoides*.

m ZANGHERI, S.
Le tignole dell'uva (*Clysia ambiguella* Hb. e *Polychrosis botrana* Schiff.) nel Veneto e nel Trentino. **(The grape moths *Clysia ambiguella* and *Polychrosis botrana* in Venetia and Trentino.)**
*Riv. Vitic. Enol.*, 1959, **12**: 3-12, 39-47, bibl. 11, illus.
Biology and control measures.

## WEEDS AND WEED CONTROL

### *General.*

(*See also* 2416b.)

368. TREVETT, M. F., AND MURPHY, H. J.
**A guide for the use of chemical weed killers in 1959.**
*Misc. Publ. Me agric. Exp. Stat.* **635**, 1959, pp. 29, illus.

As in the previous publications [see *H.A.*, 27: 2347 and 28: 2511m] clear directions are given on choice of herbicides and times and methods of applying them, for weed control in vegetables, small fruits and turf. The number of suggested materials is increased from 16 to 19. Information on the control of specific weeds, undesirable trees and shrubs is also brought up to date.

2369. ANON.
Weedazol a base di amino-triazolo per la lotta contro le infestanti dei vigneti, agrumeti, frutteti, risaie, canali di scolo e di irrigazione. **(Weedazol (active ingredient amino triazole) for weed control in vineyards, citrus orchards, ricefields, and in drainage and irrigation canals.)**
*Lotta antiparassitaria*, 1958, **10**(4): 8-10, illus.

The following recommended rates for amino triazole are included:—in vineyards, 1·5–5 kg./ha. in 500–600 l. water with or without prior cutting, with repeat of 2·5–3 kg./ha. if necessary; in citrus orchards, 1·5–3 kg./ha. in 600–800 l. water; in pears, apples and plums, 2·5–4 kg./ha. in about 600 l. water; in irrigation and drainage canals, 3·5–5 kg./ha. in 400–600 l. water applied to dry ditches; in carrots, 1–1·5 kg./ha. in 300–500 l. water pre-emergence 4 or 5 days after sowing.—From *Weed Abstr.*, **8**, No. 395.

2370. EMOND, R. E., AND OTHERS.
**Soil sterilants and soil fumigants.**
*Res. Rep. east. Sect. nat. Weed Cttee Canada*, 1958, pp. 89-104.

Monuron at > 60 lb./ac. and erbon at 200 lb./ac. or more appear to be 2 of the best sterilants; simazine at 20 lb./ac. and sodium chlorate at 500 lb./ac. are effective for shorter periods. At lower rates sodium chlorate benefits from the addition of MCPA, monuron, calcium nitrate or boron.—*Weed Abstr.*, 8, No. 552.

2371. STUBBS, J.
**A new herbicide [1:1′-ethylene-2:2′-dipyridylium dibromide].**
*Outlook on Agric.*, 1958, **2**: 64-8, bibl. 2, illus.

Notes on the action of what is described as a very potent rapid-acting, translocatable, non-persistent, post-emergence herbicide. It enters foliage within a few minutes of contact, so that rain falling after this period does not affect its toxic action, and it is quickly inactivated when applied to the soil. Its uses might include haulm destruction and crop desiccation as well as ordinary weed killing.

2372. CRAFTS, A. S., CURRIER, H. B., AND DREVER, H. R.
**Some studies on the herbicidal properties of maleic hydrazide.**
*Hilgardia*, 1958, **27**: 723-57, bibl. 23, illus.

Bermudagrass [*Cynodon dactylon*] and various annual grasses growing in cans were used in greenhouse experiments. The effectiveness of 1% maleic hydrazide (MH) was increased by surfactants, humectants and high humidity, and the water-soluble forms were more effective than those applied in oil carriers. Application of medicinal, paraffin or diesel oils a week after 0·4% MH, appeared to counteract the dormancy induced, but heavy oil fractions of aromatic nature enhanced the action, giving a complete kill when following 0·6% MH after 1 or 2 weeks. Among other follow-up spray treatments, the most effective was with sodium chlorate, but TCA or additional applications of MH gave positive results. Cutting Bermudagrass plants into portions and mixing with soil (as in tillage) greatly increased the rapidity of action of 4% MH if carried out 4 or more days after spraying, but 1 day was too short an interval. Annual grasses decreased in susceptibility to MH with age, and susceptibility of the species decreased in the order:—*Hordeum murinum*, *Echinochloa crus-galli*, *Bromus rigidus*, *Poa* spp. Young squash seedlings were not visibly affected by a drop of 1% dalapon, but were severely stunted by the same amount of MH applied to a cotyledon. Kidney bean seedlings similarly treated on a leaf showed stunting from both substances, that from dalapon being the less marked and in some cases only temporary.

2373. Bowen, H. J. M., and Smith, S. R.
**Effect of gamma-radiation on weeds.**
*Nature*, 1959, **183**: 907, bibl. 8, illus.

*LD*50 values for 24 common arable weeds are listed. Arable soils appear to need at least 100,000 rads to inhibit weed growth. This would also sterilize insects, nematodes and a high percentage of fungi and bacteria.—Wantage Radiation Lab., Grove.

2374. Adamson, R. M. [and Hughes, E. C.].
**Aquatic weeds.**
*Res. Rep. west. Sect. nat. Weed Cttee Canada, 1958*, p. 65.

Early spring applications of dalapon and amino triazole appear to be less effective on *Typha latifolia* than mid-summer applications. Early April treatment of *Phalaris arundinacea* with dalapon at 15 lb./ac. and amino triazole at 8 lb./ac. gave 95 and 70% control respectively.—*Weed Abstr.*, **8**, No. 632.

2375. Marlier, G.
La jacinthe d'eau. **(The water hyacinth.)**
*Fol. sci. Afr. centr.*, 1957, **3**(4): 84-5, from *Bull. agric. Congo belge*, 1958, **49**: 1578-9.

It is suggested that the manatee, which lives in Atlantic estuaries and feeds greedily on the water hyacinth, might be introduced into the upper reaches of the Congo, above the falls, where this weed is a serious problem. As manatee meat is relished by humans the animal would need protection.

### *Weed control in temperate fruit crops.*

(*See also* 2095, 2196, 2407, 2416c, i, 2417, 3094.)

2376. Adamson, R. M., and others.
**[Weed control in] horticultural crops. (b). Fruits, flowers and ornamentals.**
*Res. Rep. west Sect. nat. Weed Cttee Canada, 1958*, pp. 106-12.

*Tree fruits:* MCPA and amino triazole (ATA) appeared very promising for controlling hoary cress around fruit trees. No injury to 1-year-old apple trees occurred at the rates used of 0·75 lb./ac. of MCPA or 8 lb./ac. of ATA in the spring, or at 1·5 and 8 lb./ac., respectively, in the autumn around bearing apple and prune trees. A spring application of ATA at 8 lb./ac. was more effective in controlling couch grass than dalapon at 15 lb./ac., where regrowth occurred by midsummer. *Small fruits:* In strawberries, monuron at rates up to 1 lb./ac. gave poor weed control during the winter. No treatment was equal to the current recommendation of propham at 6 lb./ac.+dinoseb (amine) at 3 lb./ac. In a spring trial good control with negligible injury was obtained with 2,4-DES at 4 lb./ac. Simazine, even at 1½ lb./ac., was injurious when applied 8 days after planting. In a loganberry planting, ATA at 2 lb./ac.+dalapon 5 lb./ac., applied in early May as a directional spray in a 3-ft. band up to the base of the plants gave good control of both broadleaved and grassy weeds without causing significant injury. *Flowers and ornamentals:* When garden flowers were sprayed with neburon at the flowering stage considerable resistance was shown by delphinium, lily, ageratum, aster, marigold and nemesia, while pansy, salpiglossis and zinnia suffered some injury, and alyssum and phlox were severely damaged. SMDC [Vapam] at 1 lb./100 sq. ft. showed promise as a pre-planting treatment for evergreens. Of autumn treatments tried none was more effective than the CIPC-monuron standard recommendation in daffodils. Experiments indicated that heavy rainfall following herbicidal treatment may be responsible for occasional weed control failure in bulb planting.—From *Weed Abstr.*, **8**, No. 584.

2377. White, R. G., and others.
**[Weed control in] fruits.**
*Res. Rep. east. Sect. nat. Weed Cttee Canada, 1958*, pp. 71-9.

The reaction to herbicidal applications is reported for the following crops: apple, pear, peach, raspberry, vine, strawberry and cranberry.—From *Weed Abstr.*, **8**, No. 397.

2378. Robinson, D. W.
**The chemical control of grass in fruit plantations.**
*Res. exp. Rec. Minist. Agric. Belfast, 1957*, 1958, **7**: 72-8, bibl. 2.

An application of 7·5 lb. of dalapon per acre in

March and again in July to the ground around Bramley's Seedling trees prevented the growth of couch grass throughout the season. The trees were injured at 15 and 22·5 lb. per acre. Dalapon applied at 3·75 lb. per acre in early spring controlled annual meadow grass in gooseberries and black currants. At 7·5 lb. per acre growth of couch grass was prevented for about 10 weeks, but with some leaf injury to gooseberries. A mixture of 2 lb. MCPA and 7·5 lb. dalapon applied in March gave good control of annual meadow grass and creeping buttercup without injury to black currants, though MCPA had a slight inhibitory effect on dalapon action. Strawberries were severely injured by an April application of dalapon at rates necessary to kill the grasses.

2379. Karnatz, H.
Chemische Unkrautbekämpfung in Obstanlage und Baumschule. **(Chemical weed control in orchard and nursery.)**
*Mitt. ObstVersuchringes Jork*, 1959, **14**: 43-7.

In pome fruit, both in the nursery and in the orchard, as well as in raspberries, gooseberries and red but not black currants, good weed control, without injury to the crop, was obtained with simazine applied in the spring at the rate of [illegible] kg./ha. Cultivation of the soil before spraying made the treatment more effective. Hoeing after spraying also assisted where weeds were growing under the bushes. As the chemical does not affect the foliage of top or small fruit, special precautions in its application are not required.

2380. Quaglia, A.
Alterazioni da 2,4-D su melo e pero. **(Damage to apple and pear trees by 2,4-D.)**
*Inf. fitopat.*, 1958, **8**: 252-5, illus.

Kaiser pear and Durello apple trees were sprayed in error with a product containing 40% of 2,4-D sodium salt at 0·7 kg. per hl. of water. The resulting injuries and deformities are described and illustrated. Leaf injuries were more severe in the pear than in the apple.

2381. (Beattie, J. R)
**Post-harvest amino control in Mass.**
*Cranberries*, 1958, **23**(4): 1.

Amino triazole at 8 lb./ac. in 300 gal. is recommended for post-harvest control in cranberries of cutgrass [*Carex bullata*], nutgrass [*Cyperus esculentus*], *Aster* spp., panic grass [*Echinochloa crus-galli*], and white violets [*Viola ? pallens*]. Spraying should not be done until at least 5 days after harvest. For best results the weeds should be green.—*Weed Abstr.*, **8,** No. 585.

2382. Dana, M. N.
**Selective weed killers for cranberries.**
*Cranberries*, 1958, **23**(4): 7-8.

In Wisconsin MH at 10 lb./ac., applied in cranberries in late July or early August, gave excellent control of *Onoclea sensibilis* and *Polygonum natans* the following year. The maturing crop was not measurably reduced, but in some plots the flower bud set and succeeding crop were reduced. MH at 5 lb./ac. was not so effective. Plots heavily infested with *Carex rostrata* were kept free of this weed for 3 years after spraying with dalapon at 6–18 lb./ac. applied post-harvest. The cranberry crop was a complete loss the year after treatment, but in the second year after treatment yield from the 18-lb./ac. plot was more than double that of the control [see also *H.A.*, 28: 350]. Wiregrass [*Aristida dichotoma*] has also been reduced by dalapon.—*Weed Abstr.*, **8,** No. 590.

2383. (Doll, C. C.)
**Compare chemicals to control weeds in grape vineyards.**
*Ia Fm Sci.*, 1959, **13**: 178-9, illus.

Control of annual weeds in a newly-planted and a 2-year-old vineyard was excellent throughout the season with diuron at 1, 2, 3 and 4 lb./acre, and with simazine at 2 and 4 lb./acre. Weed control with CIPC was good early in the season. All treatments caused some plant injury, but it was least with 1 lb. diuron per acre. Shoot growth measurements at the end of the season tended to favour diuron.

### *Weed control in ornamentals.*

(*See also* 2376, 2416a.)

2384. Warren, G. C., and others.
**[Weed control in] ornamentals.**
*Res. Rep. east. Sect. nat. Weed Cttee Canada, 1958*, pp. 80-5.

Pre-sowing and post-emergence herbicidal applications in conifers are described. In gladiolus, as pre-emergence treatments, promising results were given by simazine, EPTC and CDAA. Applications of 2,4,5-TES at 10 lb./ac. and 2,4-DES at 12 lb./ac. caused no injury to petunias, ageratum, calliopsis, salvias or marigolds; CIPC at 4 lb./ac. injured all except marigolds.—From *Weed Abstr.*, **8,** No. 385.

2385. Veličko, Ja. M.
**The use of herbicides in nurseries.** [Russian.]
*Bjull. nauč.-teh. Inf. Leningrad Inst. les. Hoz.*, 1957, 3: 13-19.

2,4-D, MCPA and 2,4,5-T at 0·5–2 kg./ha., DNC at 10 and 12·5 kg./ha., DNIF [dinitro isopropylphenol ?] at 12·5 and 25 kg./ha., propham at 15 and 20 kg./ha., potassium thiocyanate at 20 and 30 kg./ha., potassium chlorate at 10 and 20 kg./ha. and shale oil at 300 and 500 l./ha. were applied 4–7 days after sowing ash [*Fraxinus* sp.], wild olive, Siberian acacia [*Caragana arborescens*], *Prunus* spp., mulberry [*Morus* sp.], smoke tree [*Cotinus cogyggria*] and honeysuckle. Germination and development was generally normal; however, a few individuals died. Potassium chlorate was highly injurious to seedling mulberry and honeysuckle; species sown less than 2·5 cm. deep were most susceptible.—*Weed Abstr.*, **8**, No. 586.

2386. Bivins, J. L., and Harvey, W. A.
**Weed control in Shasta daisy.**
*Calif. Agric.*, 1959, **13**(2): 15, illus.

Plots of Shasta daisies which were sprayed in early May with neburon at 2, 4 or 6 lb. active ingredient per acre showed excellent weed control for 5 months, 10 months, and more than a year, respectively, without crop injury. Irrigation (or rain) is necessary after the spray application to wet the soil to a depth of several inches.

2387. Hoogeterp, P.
Chemische onkruidbestrijding bij bloembollen. (**Chemical weed control for bulbs.**)
*Weekbl. BloembollCult.*, 1959, **69**: 591.

In 3 years' trials weed control in bulbs was good with CIPC, and early spring application was slightly more effective than autumn application. The best results were obtained with 2 treatments, each at a rate of 4 l. CIPC/ha., and indicated that under favourable conditions control might persist for 7 weeks. Many of the bulb species could safely be treated with CIPC. With lilies (*Lilium tigrinum, L. speciosum rubrum, L. umbellatum*) the risk with CIPC appeared to be reduced as the period between spray application and the formation of adventitious roots increased. A pre-emergence application of CIPC was satisfactory for anemones.—Proefst. Bloemboll., Lisse.

2388. Blaszyk, P.
Zur chemischen Unkrautbekämpfung in Blumenzwiebeln. (**Chemical weed control in flower bulbs.**)
*Gartenwelt*, 1959, **59**: 49-51, bibl. 2.

In a 4-year series of experiments [see also *H.A.*, 28: 1342] on weed control in tulips, excellent results were obtained by spraying in February, when the shoots were about 2 cm. high, or in April, when they had reached 10–15 cm., with a CIPC product at 6 l./ha. in 800 l. of water. A similar half-strength product used at double this concentration was equally effective. December treatment was less successful. A dust preparation of CIPC, 25% richer in active material than the fluid, applied at 40 kg./ha. mixed with superphosphate, was as effective as the spray when applied in April, but far less so in the earlier applications, and the tulips died after the February treatment. Allipur, a commercial mixture of urea derivatives and the ester of carbamino acid, sprayed in April at 8 l./ha. was as effective as CIPC. Simazine dust, applied at the same rate and times as CIPC dust, gave excellent results, even from the December treatment. In solution at 2 kg./800 l./ha., however, application in December gave poor results, but in spring good control was achieved within a month. For weed control in narcissi CIPC at the above rate gave poor results in autumn, but was very effective in early April, either as dust or spray, and simazine was equally good, giving better control than CIPC of cudweed (*Gnaphalium* spp.). In narcissus and crocus propagation beds CIPC at 8 l./600–800 l. of water gave good results when applied soon after removal of the straw cover. Even flowering crocuses were unharmed by spraying. Weeds showing resistance to CIPC included groundsel (*Senecio vulgaris*) and hemp-nettle (*Galeopsis* sp.).

2389. Salinger, J. P.
**Chemical weed control in gladiolus.**
*N.Z. J. Agric.*, 1958, **97**: 535-6, illus.

Six alternative chemical treatments for weed control in gladiolus are recommended. Trials have shown that 2 applications of the appropriate weedkiller will replace 5 cultivations without damage to the plants. Small plots of gladiolus may be kept weed-free by mulching with sawdust (plus N).

2390. Bing, A.
**No need for weeds in cymbidiums.**
*Bull. N.Y. St. Flower Grs*, 1959, No. 158, p. 2, bibl. 3, illus.

At 5 lb./ac. Karmex DW safely controls weeds in cymbidiums. Repeat applications may be necessary after 8–12 months.

### *Weed control in tobacco and miscellaneous crops.*

2391. Fatus, G. K., and Matveenko, T. M.
**Herbicides in tobacco seedbeds.** [Russian.]
*Zašč. Rast. Vred. Bolez.*, 1958, No. 6, pp. 37-8, illus.

Propham, CIPC and DCU were all applied at 5–20 kg./ha. as pre-sowing treatments in tobacco seedbeds. DCU caused no injury even when sowings were carried out 15 days after treatment; a period of 45 days was necessary before propham lost its toxicity, and CIPC was toxic for even longer. DCU at 5 and 10 kg./ha. resulted in a better and more vigorous stand than the controls. Propham at 5 kg.+DCU at 5 kg./ha. was less satisfactory than DCU alone.—*Weed Abstr.*, **8**, No. 392.

2392. Murphy, J. R.
**Tobacco: simazine and analogues, EPTC, CDAA and FB.2.**
*Res. Rep. east. Sect. nat. Weed Cttee Canada, 1958*, p. 42.

When applied 5 days after planting out Hicks Broadleaf tobacco, simazine at 1 lb./ac. and 2-chloro-4-(ethylamino)-6-(diethylamino)-s-triazine at 1 and 2 lb./ac. caused slight stunting. Applied to a loose dry soil after one cultivation, Geigy 30026 at 1 lb./ac. and 2-chloro-4-(isopropylamino)-6-ethylamino)-s-triazine at 1 lb./ac. were highly injurious, 2-chloro-4-(isopropylamino)-6-(diethylamino)-s-triazine at 2 lb./ac. caused severe stunting and diquat at 0·5 lb./ac. only moderate stunting. No damage was caused by simazine at 0·5 and 1 lb./ac. or by 2-chloro-4-(ethylamino)-6-(diethylamino-s-triazine at 1 lb./ac. EPTC at 2·5 lb./ac. caused only a trace of scorch while at 10 lb./ac. it and CDAA at 4·6 lb./ac. caused severe scorch.—*Weed Abstr.*, **8**, No. 393.

2393. Petunova, A. A.
**Chemical weed control in coriander with mineral oils.** [Russian.]
*Trudy Inst. Zašč. Rast.*, 1958, No. 11, pp. 152-65, bibl. 15, illus.

Coriander was sprayed pre- and post-emergence (1·5 leaf stages) with diesel and shale (heating) oils at 400–600 l./ha.; seed yields were reduced negligibly or not at all, the percentage of ethereal oil was decreased somewhat and that of coriandrol raised slightly. For early post-emergence use 400 l./ha. is recommended, for later use 600 l. Control of weeds, including *Setaria glauca* and *Chenopodium album*, was excellent. A 30% emulsion of an aromatic petroleum oil at 500 l./ha. injured the crop, while a 20% emulsion of a shale oil caused little crop injury and gave as good weed control. Band spraying in conjunction with inter-row cultivation gave promising results. Sections showed that oil penetrated into the cells of susceptible species, but only into the inter-cellular spaces, vessels and oil ducts of coriander.—*Weed Abstr.*, **8**, No. 379.

2394. Gladwin, T. J., and Kroll, U.
**Weedkiller trials at the Pyrethrum Research Station, Molo.**
*Publ. Pyrethrum Res. Adv. Cttee* **23**, 1958, pp. 7.

Of a number of herbicides applied to established pyrethrum in early May, the best results were given by power kerosene at 80 gal./ac. which caused temporary injury only. Some pre-planting treatments are also mentioned.—From *Weed Abstr.*, **8**, No. 588.

*Weed control in tropical and sub-tropical crops.*
(*See also* 3009, 3039.)

2395. Simanton, W. A.
**Weed control in citrus planting sites.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 114–18, bibl. 2, illus., and *Citrus Ind.*, 1959, **40**(2): 9-10, 18-20, bibl. 2, illus.

Combined herbicide and tillage pre-planting treatments were successful in removing the major grass weeds from citrus planting sites. On one site ploughing during a dry winter destroyed 95% of pangola (*Digitaria decumbens*), and spot spraying with dalapon eliminated the remainder. On another site autumn ploughing destroyed 70% of the grasses, and in the following spring 2 sprays of 15 lb. dalapon per acre eliminated the rest.—Fla Citrus Exp. Stat., Lake Alfred.

2396. King, J. R., Simanton, W. A., and Kretchman, D. W.
**Chemical control of weeds in Florida citrus grove ditches.**
*Proc. Fla St. hort. Soc, 1958.*, 1959, **71**: 157-66, bibl. 3, illus.

A single application of Karmex DW at 40 lb./acre or Urox at 200 lb./acre controlled a weed mixture of grass, broadleaf and woody plants for 1 year or more. The best results were obtained during a relatively dry year, when treatments were applied before weed growth became dense. Where para-grass (*Panicum purpurascens*) or cattails (*Typha* spp.) were the main problem, 2 applications of Dowpon at 10 lb./acre with a 2-week interval gave economical control for about 6 months. *Typha* was also controlled by a single application of amino-triazole at 10 lb./acre and Experimental Compound 2603 at 5 gal./acre. No injury was observed on citrus trees growing within 30 ft. of the ditches, except for one case of spray drift.—Fla Citrus Exp. Stat., Lake Alfred.

2397. de Weille, G. A.
Biologische alang-alangbestrijding. (**Biological control of lalang.**)
Het alang-alangvraagstuk. (**The lalang problem.**)
Mechanische bestrijding van alang-alang. (**Mechanized control of lalang.**)
Chemische alang-alangbestrijding. (**Chemical control of lalang.**) [English and Indonesian summaries from 5 lines to 2½ pp.]
*Ber. Alg. Proefst. AVROS, Medan*, **12**, 1957, pp. 8, bibl. 6, illus.; **16**, 1958, pp. 19, bibl. 17; **17**, 1958, pp. 10, bibl. 11; and **22**, 1958, pp. 55, bibl. 22.

Examples are given of biological control of *Imperata cylindrica* by encouraging competing plant species (*Stylosanthes*, *Mikania*, *Commelina*, *Pueraria*, *Gmelina*, *Acacia* and *Cassia*).

In the second article the author discusses lalang competition with growing crops, and briefly describes mechanical, chemical, biological and physical (flame gunning along rail tracks) control methods. Chemical control, in spite of its expense, is preferred to mechanical control which may damage tree roots.

Mechanical control of lalang works in 2 ways, viz. weed removal and the physiological weakening of the weed. Mechanical control should be followed by chemical or mechanized spot treatment.

In large-scale trials of chemical control, power spraying was much more effective and cheaper than hand spraying. The herbicides sodium arsenite, Shell weedkiller EF140 (in aqueous emulsion), and Shell lalang oil (in solar oil) were used. Mist blowers were practicable for weed control, provided that the mist was blown directly downwards just above ground level.

2398. Monteith, N. H.
**Weed control in sugar cane in Fiji.**
*Proc. 11th N.Z. Weed Control Conf. 1958*, pp. 80-4.

The application of 2,4-D (ester) at 2·5 lb./ac. a.e. in 30 gal. water is recommended as a pre-emergence treatment, but germination was retarded where cane setts were not covered before spraying. Dalapon at 3·5 lb./ac. gave good grass weed control without damaging young cane; monuron at 10·5 lb./ac. was as effective but more costly; amino triazole [ATA] at 3·5 lb./ac. and TCA at 7 lb./ac. were less effective and caused damage. Monuron, dalapon and TCA showed promise for controlling *Brachiaria mutica* in drains; 3 applications of dalapon at 5 lb./ac. at 4-week intervals proved the most economical treatment. In pot trials a split application of 2% dalapon controlled *Sorghum halepense*; the addition of ATA and a detergent was of no advantage. Costs of different methods of control used on the island are given.—From *Weed Abstr.*, **8**, No. 493.

2399. Rochecouste, E.
**Observations on chemical weed control in Mauritius.**
*Bull. Mauritius Sugar Ind. Res. Inst.* **10**, 1958, pp. 52+appendices, bibl. 32, illus.

After a general review of the problems of weed control in sugar cane and of modern herbicides, the author lists over 200 weeds which occur in sugar cane, together with their distribution, agricultural importance and the recommended method of control.

2400. Rochecouste, E.
**Observations on the chemical control of chiendent (*Cynodon dactylon*) and herbe mackaye (*Phalaris arundinacea*.)** [French summary ½ p.]
*Rev. agric. sucr. Maurice*, 1958, **37**: 259-64.

The most effective treatments for *Cynodon* control were: TCA at 100, 150 or 200 lb./arpent [1·043 acre] and TCA at 100 lb.+dalapon at 40 lb./arpent. For *Phalaris* control TCA at 100 lb.+sodium chlorate at 100 lb./arpent was the best. Time of application was most important, the best results being obtained in May, September and October. The weeds were not destroyed by single applications, and the need for further research is emphasized.

2401. Hauser, E. W., and Arle, H. F.
**Johnson grass as a weed.**
*Fmrs' Bull. U.S. Dep. Agric.* **1537**, revised 1958, pp. 14, illus, 10 cents.

Advice for sugar cane farmers is given as follows:—Where the grass is established, 6 to 8 thorough ploughings should be given in the summer before planting. For the plant-cane crop planted Aug. 1 to Oct. 15 apply a pre-emergence spray containing 1 lb. (a.e.) of the amine salt of 2,4-D per acre on a 36-in. band along the row. About 3 weeks later apply 4 to 7 lb. TCA (90%) on a 24-inch band. Cultivate the middles and hand rogue to destroy grass. In spring apply 4 lb. per acre of TCA as a spray on a 24- to 30-in. band centred over the row. A month later, or after fertilizing the cane, apply 4 lb. TCA plus 1 lb. 2,4-D on a 24-30-in. band. At lay-by time (i.e. the final fertilizing) broadcast a 2,4-D spray at 2 lb. per acre. Hand rogue if necessary. For badly infested stubble cane, after shaving and off-barring the cane, spray with 11 lb. 90% TCA plus 1 lb. a.e. amine 2,4-D on a 24-30-in. band. If necessary, before the grass reaches 10 in., spray with 4 lb. dalapon. For spot infestations apply 1 lb. per acre 2,4-D on a 24-30-in. band after the cane is shaved and off-barred. Later use either 1–1½ lb. sodium chlorate plus ½–¾ lb. calcium chloride per gal. of water or ¾ lb. 90% TCA per gal. of water or ¼ lb. 85% dalapon per gal. of water.

### ***Weed control in turf.***

(*See also* 2416c.)

2402. Breakey, W. J., and others.
**Weeds in lawns.**
*Res. Rep. west. Sect. nat. Weed Cttee Canada, 1958*, pp. 66-8.

Neburon at 2–8 lb./ac., 2,4,5-TP at 1 lb./ac. and DB Granular [7·5% 2,4-D+borates] at 1 lb./100 sq. ft. gave good control of *Cerastium vulgatum*; 2,4,5-TP caused least turf injury and DB Granular most. 2,4-D at 1 lb./ac. gave much better control of *Bellis perennis* and less turf injury than 2,4,5-TP, neburon or DB Granular. Neburon gave better selective control of *Stellaria media* than diquat, 3-(3,4-dichlorophenyl)-1, 1-diethyl urea or sodium arsenite. SMDC at 1 lb./100 sq. ft. killed *Holcus lanatus* and *Dactylis glomerata* in lawns when applied as a spot treatment; chewings fescue sown 2 weeks after treatment grew well.—*Weed Abstr.*, **8**, No. 671.

2403. Boyce, J. H., and others.
**[Weed control in] turf.**
*Res. Rep. east. Sect. nat. Weed Cttee Canada, 1958*, pp. 105-7.

2,4,5-TP at 1·5–2 lb./ac. gave 95–100% control of chickweed [*Stellaria media*] without grass injury and was also very effective against white clover [*Trifolium repens*]. Neburon and amino triazole also gave promising results on chickweed. Spring applications of amino triazole killed chickweed, shepherd's purse and clovers at 0·5 lb./ac., plantain at 1 lb./ac., and dandelion, catnip [*Nepeta catoria*] and burdock [*Arctium lappa*] at 1·5 lb./ac.—From *Weed Abstr.*, **8**, No. 388.

### *Weed control in vegetables.*

(*See also* 2416c, 2417, 2418.)

2404. Roberts, H. A.

**Studies on the weeds of vegetable crops. I. Initial effects of cropping on the weed seeds in the soil.**

*J. Ecol.*, 1958, **46**: 759-68, bibl. 18. illus.

In land, on which horticultural crops were grown and given normal cultivations for weed control, there was a decrease in the number of viable weed seeds after the first year to 38% and after the second year to 19% of the original level. There was a considerable difference in the response of the numerous species recorded. However, the number of seeds remaining was still amply high enough to be able to cause a rapid reinfestation.—*Weed Abstr.*, **8**, No. 598.

2405. Saidak, W. J., and others.

**[Weed control in] horticultural crops.**

*Res. Rep. east. Sect. nat. Weed Cttee Canada, 1958*, pp. 55-70.

Weed control in vegetables is discussed in 27 short reports. On a mineral and an organic soil asparagus, beans, beet, cabbage, carrot, cucumber, lettuce, parsnip, pea and tomato were treated with ATA at 4 and 8 lb./ac.; on the mineral soil both rates were toxic to all crops except parsnip, while on the organic soil the only crop to be affected by 8 lb./ac. was tomato.—From *Weed Abstr.*, **8**, No. 384.

2406. King, E. M., and others.

**[Weed control in] horticultural crops—(a) Vegetables and sugar beet.**

*Res. Rep. west. Sect. nat. Weed Cttee Canada, 1958*, pp. 94-105.

*Asparagus:* July applications of amino triazole at 16 lb./ac. effectively controlled Canada thistle with only minor injury to the crop plant. *Beets:* 70% control of annual weeds was achieved for 4 weeks by pre-emergence applications of CDEC at 1 lb./ac. with negligible damage to the beets. CDEC+ liquid cyanamide applied after weed emergence showed promise. *Cauliflower:* CDEC at 6 lb./ac. as a pre-planting treatment showed promising weed control for several weeks with only slight injury to the cauliflower. *Onion:* A cyanamide solution at 6 gal./ac. appeared superior to Aero Cyanate as a pre-emergence herbicide. *Tomato:* CDEC at 6 lb./ac. gave 70% weed control without reducing yields. Other materials gave better weed control but caused severe crop damage.—From *Weed Abstr.*, **8**, No. 580.

2407. Crabtree, G.

**Weed control in horticultural crops.**

*Proc. 7th annu. Ore. Weed Conf., 1958*, pp. 17-18.

Golden Delicious and Butternut squashes proved more susceptible to NPA than most varieties. Stoddart solvent at 75 gal./ac. gave rather better weed control when applied post-emergence to carrots than did 25 gal.+CIPC at 2 lb./ac. In new plantings of strawberries outstanding results were given by Randox T [CDAA], Geigy 30028 [2-chloro-4,6-bis (isopropylamino)-s-triazine] and 2,4-DES+CDEC or CDAA.—*Weed Abstr.*, **8**, No. 381.

2408. Vojtov, P. I.

**Mechanizing vegetable growing with the aid of herbicides.** [Russian.]

*Sad i Ogorod*, 1959, No. 2, pp. 28-9.

A description is given of the OKN-28 tractor-drawn sprayer, which greatly improves herbicidal application and reduces production costs in vegetables. In carrots hand weeding plus the application of tractor kerosene, and in onions TCA pre-emergence at 26 kg./ha. or post-emergence 17 kg./ha., gave higher yields than hand weeding alone.

2409. Michiels, A.

Le désherbage des asperges au moyen de cyanamide calcique. (**Weed control in asparagus by means of calcium cyanamide.**)

*Parasitica*, 1959, **15**: 37-41, bibl. 9, illus.

A recommended pre-emergence treatment consists of applying 3 kg. of calcium cyanamide per 100 sq. m.; it should be applied when the ridged beds have been raked finely. Later, during the growing season, one or two applications of calcium cyanamide can be made to destroy further weeds and also to supply the necessary nitrogen.—Comptoir belge Azote, Bruxelles.

2410. Sánchez Émers, O.

Herbicidas en fríjol. (**Herbicides for beans.**)

*Rep. III Reun. interamer. Fitogen. Fitopat. Ent. Edafól., Bogotá 1955*, 1958, p. 279.

Results are summarized from 3 localities in Colombia. Treatments resulting in the highest yield increases were 2–4 kg. per ha. of DNPE (ammonium salt of 2,4-dinitro-ortho-*sec*-butylphenol) applied in bands, and 8 kg. per ha. of the same product broadcast. Good results were given by a mixture of 6 kg. of DNPE and 0·25 or 0·5 kg. of 2,4-D per ha., but in one locality hand weeding proved better than chemical treatment. The results from PCP at 10 kg. per ha., used in 2 localities, were not satisfactory compared with those from other treatments.

2411. Thornton, B. J.

**Colorado reports on control of perennial weeds.**

*Agric. Newsl.*, 1959, **27**(2): 4-5.

Formulations of trichlorobenzoic acid have given excellent control of Russian knapweed [*Centaurea repens*] and bindweed, with good control of Canada thistle [*Cirsium arvense*] and leafy spurge [*Euphorbia* *esula*]. Bean yields may, however, be seriously depressed in the year after application.—Colo St. Univ.

2412. CUISANCE, P., GODIN, A., AND RICHARD, M. La destruction des sanves dans les betteraves. **(Charlock control in beetroot.)** *Phytoma*, 1959, No. 104, pp. 14-15, illus.

A 1·5% solution of copper sulphate crystals at 600 l./ha., applied with a low pressure sprayer, is recommended to suppress (but not kill) *Sinapis arvensis* in beetroot for long enough to allow thinning. The weather should be fine at the time of treatment and up to 48 hours after, and the weed should be at least in the 3-leaf stage. Copper nitrate 2·0–2·5% is equally effective but more extensive. Sodium chloride and Sylvinite 30 kg./hl. are cheap and effective but difficult to dissolve. Sylvinite granular requires 1,000–1,200 kg./ha. and should be applied in the morning when dew is on the ground, but it causes superficial "icing" of heavy soils. DNC is undependable and sometimes injurious to beet.—From *Weed Abstr.*, **8,** No. 486.

2413. LACHOVER, D., HURWITZ, S., AND LESHEM, Y. **Chemical composition of selective oils and determination of optimal carrot spraying conditions.** *Ktavim*, 1958, **8**: 307-35, bibl. 25, illus.

Chemical and physical studies were made on 2 oil carriers and one fortifier to determine the causes of phytotoxicity to carrots. Recommendations are made as regards times of spraying and concentrations, and the oil spray susceptibility of the prevailing weed species are recorded.

2414. PURNELL, D., LITTLE, T. M., AND SHADBOLDT, C. A. **Chemicals on weeds in onions.** *Calif. Agric.*, 1959, **13**(5): 13.

Weed control in onions with potassium cyanate was best at a rate of 18 lb./acre in 50 gal. water. At 6 quarts of dinitro selective in 60 gal./acre weed control was good, but there was some foliage scorch. Applications of neburon (2 and 4 lb./acre) and simazine (3 and 6 lb./acre) applied just after transplanting gave complete control of lamb's quarters [*Chenopodium album*] and mustard, but simazine was phytotoxic. Promising control was obtained with CIPC, CDAA and CDEC. Yields from all treated plots were significantly higher than those from control plots.

2415. VAN STAALDUINE, D., AND KOERT, J. L. Chemische onkruidbestrijding in de uienteelt. **(Chemical weed control in onions.)** *Meded. LandbHogesch. Gent*, 1958, **23**: 1029-40, bibl, 6, illus.

Five treatments were used pre-emergence and 7 post-emergence. Pre-emergence, sulphuric acid or PCP in oil ± CIPC and, post emergence, CIPC, DNC, dinoseb and simazine have given good results.—From *Weed Abstr.*, **8,** No. 382.

*Noted.*

2416.

a ANON. **Chemical weed control for gladiolus 1958.** *Mimeo, Rep. Cornell Ornamentals Res. Lab.*, [1958 ?], pp. 2.
Contains a table of materials and rates suggested for trial.—From *Weed Abstr.*, **8,** No. 389.

b BECKER, C. F., AND COSTEL, G. L. **Equipment for the application of granular herbicides (Progress Report I.)** *Mimeo. Circ. Wyo. agric. Exp. Stat.* **102,** 1958, pp. 18, illus.
Machine designed for selective weed control in sugar beet.

c BINGHAM, S. W., AND OTHERS. **Weed control recommendations.** *Bull. Miss. agric. Exp. Stat.* **556**, 1958, pp. 35, illus.
Including strawberries, cucurbits, beans, peas and lawns.—From *Weed Abstr.*, **8,** No. 390.

d IZARD, C. Recherches biochimiques sur les graines de l'orobanche parasite du tabac. I. Variations des acides aminés et des sucres. II. Obtention d'un pigment flavonique. **(Biochemical studies on the seeds of broomrape parasitic on tobacco. I. Changes in amino acids and sugars. II. Isolation of a flavonoid pigment.** *Ann. Inst. exp. Tabac Bergerac*, 1958, 3(1): 77-83, bibl. 4, illus.

e MUNE, T. L., AND PARHAM, J. W. **The declared noxious weeds of Fiji and their control.** *Bull. Dep. Agric. Fiji* **31,** revised 1958, pp. 74, bibl., illus.
Differs little from the original edition [see *H.A.*, 28: 359.]

f NATIONAL WEED COMMITTEE, EASTERN SECTION. **1959 weed control recommendations for Eastern Canada.** [*Publ.*] *Canada Dep. Agric.*, [1958], pp. 28.
For weed control workers.

g NATIONAL WEED COMMITTEE, WESTERN SECTION. **1959 weed control recommendations for Western Canada.** [*Publ.*] *Canada Dep. Agric.*, [1958], pp. 41.
For weed control workers.

h PETERSON, D. R., AND BUCHHOLTZ, K. P.
**Controlling brush, stump and small trees with chemicals.**
*Circ. Univ. Wis. Ext. Serv.* **564**, 1958, pp. 7, illus.

Includes table showing response of 32 species to 2,4-D and 2,4-D + 2,4,5-T.

i WATSON, E. B., AND HAES, E. C. M.
**Trials with a new weed control.**
*Grower*, 1959, **51**: 630.

An aminotriazole formulation for control of couch grass and other perennial weeds in apples and soft fruit.

## VEGETABLES, TEMPERATE, TROPICAL AND GLASSHOUSE

### *General.*

(*See also* 2024, 2092r, 2167, 2176, 2186p, 2366o, 367d, 2599m, x, 2600j, 2603, 3086, 3089, 3097, 3099, 3107, 3112.)

417. ALKMAAR.
*4ᵉ Jaarverslag 1958, Proefstation voor de Groenteteelt in de Volle Grond in Nederland.* **(Fourth Annual Report of the Experiment Station for Vegetable Growing in the Open in the Netherlands.)**, 1959, pp. 95, illus., fl. 2.

This report describes work on the following subjects: *Soils and manures:* The effects of chemical and organic manures and composts on various soil types and crops. *Breeding:* Of asparagus, beans, peas and brussels sprouts. *Variety trials:* with strawberries, gherkins, beans, celeriac, beetroot, lettuces, leeks, spinach and beans. *Cultural methods:* Strawberry soil cultivations, time of planting and watering; controlling soil erosion in asparagus beds, and the relationship between the length of the cutting season and yield; growing gherkins, and pre-soaking their seeds; times of sowing and planting cauliflowers; spacing of beans and celeriac; storage of shallots; bean vernalization; sowing, harvesting and cutting the roots of chicory. *Pests and diseases:* White cabbage banding, lettuce mosaic and big-vein, carrot storage rot, disinfection of spinach and carrot seeds, foot-rot of asparagus; carrot root fly, cabbage root fly, chicory fly (*Napomyza lateralis*) and *Ceuthorhynchus pleurostigma*. *Weed control:* In strawberries, endive, cauliflowers, peas, parsley and celery, leeks, rhubarb, shallots, beans, spinach, chicory, cabbages and carrots.

2418. (SNYDER, G. B.)
**Department of Olericulture.**
*A.R. Mass. agric. Exp. Stat. 1956-7*, being *Bull.* **503**, pp. 43-5.

The following among other conclusions were reached: Maleic hydrazide was valuable for preventing sprouting in stored onions. Particularly good results followed the use of Karmex W at 3 to 4 lb. per acre as a herbicide in asparagus, of chloro-IPC at 12 to 16 lb. in onions, and of dinitro (Premerge) at 1 gal. per acre immediately after planting pickling cucumbers. A night temperature of 54° F. was too low for best quality tomato production in the glasshouse, one of 64° F. gave the highest percentage of No. 1 fruit, while one of 58° F. gave the highest yield of No. 1 fruit and total weight. Blotchy ripening was greatest in the high temperature house. Spinach for pre-packaging was best picked when leaves were slightly wilted and not too turgid.

2419. VOGEL, G.
Ergebnisse der Saatgutpillierung und -inkrustierung im Gemüsebau. **(The results of pelleting vegetable seeds.)**
*Dtsch. Gartenb.*, 1959, **6**: 68-70, bibl. 6, illus.

Pelleting onion seeds with chlordane gave excellent results against onion fly, the crop being protected against two generations of the pest. Otherwise, the treatment had no advantages. Experiments with carrots were inconclusive, because the controls remained free from carrot fly infestation. With beetroot cracking the seed coat significantly increased yields and thinning out became unnecessary. Subsequent pelleting of the cracked seeds facilitated machine sowing.—Inst. f. Gartenb., Grossbeeren.

2420. MOHOLM, R.
Försök med minatyrväxthus vid Söråker 1953-1957. **(Experiments with a minature glasshouse at Söråker 1953-57.)** [English and Esperanto summaries 1 p. each.]
*Medd. Trädgårdsförs. Alnarp* **117**, 1958, pp. 22, bibl. 4, illus.

Continuous cloche cropping of 7 vegetables in northern Sweden is described. The advance possible in harvesting date was 7 days for spinach, 7–14 days for lettuces and 11–14 days for radishes. Compared with production in the open, spinach yields (in a warm season) were lower, and ridge-cucumber yields much higher.

2421. NEZGOVOROV, L. A., AND SOLOV'EV, A. K.
**Cold resistance of plants and the pathogen content of the soil.** [Russian, with English summary ½ p.]
*Fiziol. Rast.*, 1958, **5**: 424-33, bibl. 21, illus.

Eggplants, peppers and various cucurbits grown in sterile, fungicide-treated and ordinary soil were subjected to chilling (6–15° C.) for different periods. Plant mortality was 25–50% in the untreated soil, but insignificant in the treated soils. Seed treatment with a fungicide afforded rather less protection.

2422. Eguchi, T., Matsumura, T., and Ashizawa, M.
**The effect of nutrition on flower formation in vegetable crops.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 343-52, bibl. 14, illus.

Flower initiation of Japanese radish and pak-choi cabbage (induced by low temperature) and of Indian mustard (induced by photoperiod) was little affected by levels of NPK fertilization, except when the conditions of induction were near the critical level. Flower formation in tomato (a day-neutral plant) was considerably affected by nutrition; initiation occurred only in the NPK or NP plots, and fruit formation occurred in plots receiving 2 or 4 times the standard amount of NPK. With eggplants (also day-neutral) flowering occurred only in the 4(NPK) and 2(NPK) plots; flower buds were initiated in the other plots, though in the NK, PK, N and P plots initiation was delayed. Flower bud initiation of capsicum was considerably delayed in plots without N or P.—Nat. Inst. agric. Sci., Hiratsuka, Japan.

2423. Boek, K., and Schuphan, W.
Der Nitratgehalt von Gemüsen in Abhängigkeit von Pflanzenart und einigen Umweltfaktoren. (**The nitrate content of vegetables in relation to plant species and to certain environmental factors.**) [English summary ½ p.]
*Qual. Plant. Maveg.*, 1959, **5**: 199-208, bibl. 16.

Beetroot, cabbage, kale and spinach from different localities and grown under different systems of fertilizing were analysed for nitrate content. In cabbages this was 8-9 times as high in the stem as in the leaves. Beetroot increased in nitrate content as the N application was raised progressively from 0 to 180 kg. N/ha. as calcium nitrate, but with ammonium salts the effect did not extend beyond 90 kg./ha. The uptake of nitrate by spinach was increased by raising the K application, and was higher when the K was entirely sulphate than when a mixture of chloride and sulphate was used. The application of P reduced nitrate uptake by this crop. Experiments with spinach in a controlled environment showed that the nitrate content was inversely related to the light intensity, and was particularly high in plants supplied with liquid manure in place of inorganic N. In parallel experiments on N fertilizing in different parts of Germany spinach grown in the Kiel area contained more nitrate than that grown in the warmer and sunnier climate of Geisenheim in the Rhine district.

2424. Mulder, E. G., Bakema, K., and van Veen, W. L.
**Molybdenum in symbiotic nitrogen fixation and in nitrate assimilation.**
*Plant and Soil*, 1959, **10**: 319-34, bibl. 31.

Spinach plants growing in Mo-deficient soil responded within 2 hours of an Mo application to the soil by a pronounced increase in the contents of glutamic acid and glutamine, and within 8 hours the production of 7 amino compounds rose by 30–250%. In a parallel experiment with cauliflowers there was a marked rise in 6 non-protein amino compounds, including glutamic acid and glutamine, and particularly in glycine, which was low in normal plants. A striking rise in glutamine in tomato plants followed within 2 hours of the application of nitrate to N-deficient, and of Mo to Mo-deficient, plants *via* the soil. The N-deficient plants were lower than the Mo-deficient in free amino compounds, and the rise in these substances was less marked on correction of the former deficiency, but responses to the treatments were markedly similar.—Agric. Univ., Wageningen, Holland.

2425. Mulder, E. G., Boxma, R., and van Veen, W. L.
**The effect of molybdenum and nitrogen deficiencies on nitrate reduction in plant tissues.**
*Plant and Soil*, 1959, **10**: 335-55, bibl. 13.

The very low nitrate-reduction capacity of cauliflower, spinach and tomato plants grown in Mo-deficient and N-deficient soils was rapidly raised by application of the deficient element, either to the soil or by foliar infiltration, using nitrate as the N source. It reached maximal value within 4 hr. in the case of Mo. Ammonium sulphate applied *via* the soil to N-deficient cauliflowers slightly increased their nitrate-reducing capacity, but it had no effect when infiltrated into the leaves. Prolonged darkness greatly reduced, and cell injury destroyed, nitrate-reductase activity, but in some of the latter instances it was restored by adding yeast extract. In some experiments the low malic-dehydrogenase activity of Mo-deficient plants was raised by the application of Mo, but the effect was far less marked than that on nitrate reduction.—Agric. Univ., Wageningen, Holland.

2426. Muhutdinov, M. F.
**The effect of complex uses of bacterial fertilizers on the yield of irrigated tomato and cabbage.** [Russian.]
*Doklady vsesojuz. Akad. seljsk. Nauk*, 1959, **24**(2): 14-18.

Trials conducted in 3 years with tomatoes and in 2 years with cabbages showed the superiority of "bacterification" with a mixture of 3 preparations, viz. azotobacterin, phosphorobacterin and silicate bacteria, over the use of each preparation separately. The bacterified mixture gave yields almost as high as a complete fertilizer at 16–20 kg. N., 20–32 kg. P and 16–20 kg. K per ha., and at only one-tenth of the cost. Inoculation was considerably simplified by watering the seedlings with a bacterial suspension instead of the usual method of dipping the roots of transplants into it.

2427. Edson, S. N.
**Florida sawdust for home hydroponics.**
*Proc. Fla. St. hort. Soc., 1958*, 1959, **71**: 63-7, bibl. 6, illus.

Small-scale hydroponic benches for use with sawdust as the rooting medium are described and illustrated. Yields of tomatoes and cucumbers grown in these benches were higher when culture solutions were maintained below the sawdust than when a mixture of dry salts was applied at intervals to the surface and watered in. Very satisfactory results were obtained with a commercial 8-8-8 fertilizer for tomatoes in late spring and early summer, but for autumn and early spring conditions adding 2 oz. of potassium sulphate per lb. of fertilizer was an advantage. The experimental mixture also included 3 oz. of magnesium sulphate to each lb. of 8-8-8 fertilizer.—Univ. Fla, Gainesville.

2428. Barnes, W. C., and Peele, T. C.
**The effect of various levels of salt in irrigation water on vegetable crops.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 339-42, bibl. 4.

Tests using irrigation water of varying degrees of salinity showed that water containing 500 p.p.m. of sodium chloride was safe for snap beans, but that at 1,000 to 2,000 p.p.m. damage to beans was likely to be severe in most seasons. The use of water containing up to 1,500 p.p.m. had no effect on the germination or growth of seedlings of beet, cabbage, lettuce, onion and turnip. Preliminary observations indicated that cabbage, tomato and sweet corn were not injured by water containing 1,500 to 2,000 p.p.m. of sodium chloride. Salt concentration in the soil at the end of the season bore a direct relationship to toxicity symptoms observed on sensitive crops, and also to the salt concentration in the water applied except when considerable rainfall followed the irrigation. Rainfall up to 7·5 in. during the crop growing season was not adequate to prevent crop injury. No effect on soil condition or pH has yet been observed.—Clemson Coll. and Truck. Exp. Stat., Charleston, and Clemson, S. C.

2429. Smith, F. F.
**Control of insect pests of greenhouse vegetables.**
*Agric. Handb. U.S. Dep. Agric.* **142**, 1959, pp. 25, illus., 15 cents.

Salient facts are given in connection with calcium arsenate, chlordane, DDT, lindane, malathion, metaldehyde, nicotine, parathion, rotenone, sulphur and TEPP, and their use. This is followed by general notes on sanitation, soil sterilization, the use of aerosols, dusts, smokes and sprays, and then control measures against some 33 insects, which do damage in the greenhouse, are described.

2430. (Alexander, C. P.)
**Department of Entomology.**
*A.R. Mass. agric. Exp. Stat. 1956-57*, being *Bull.* **503**, 1958, pp. 29-32.

*Cucurbit pests.* Regular applications of rotenone-copper, endrin-zineb and methoxychlor-zineb dusts gave good control of all pests except the two-spotted mite, and produced significantly greater yield than no treatment. *Cabbage fly.* Soil treatment at appropriate times with heptachlor proved efficacious against the fly on cabbages and turnips. *Toxicity to pollinating insects.* Tests showed DDT, malathion and methoxychlor to be toxic to both honey and bumble bees as contact, stomach and residual poisons. Ferbam, captan, sulphur, phenyl mercury lactate and Aramite were not toxic to honey bees. Captan and phenyl mercury lactate were slightly toxic to bumble bees. Glyodin in thrice concentrated form killed many bees. *Apple pests.* Guthion proved 93–96% successful against plum curculio.

2431. Chiykowski, L. N.
**Studies on migration and control of the six-spotted leafhopper, *Macrosteles fascifrons* (Stål.) in relation to transmission of aster-yellows virus.**
*Diss. Abstr.*, 1959, **19**: 1489, being *L.C. Card No. Mic.* 58-7467 of 134 pp.

In tests with carrots leaf sprays of DDT and demeton applied at weekly intervals gave the greatest reduction of the leafhoppers and of aster yellows. Infection of lettuce yellows was reduced by parathion from 89% with treatment at 9–day intervals to 30% with treatment at 3–day intervals. Control by DDT was not improved by reducing the intervals between treatments. The greatest reduction in yellows of lettuce grown in muck soil areas was obtained by applying 2 lb. per acre of malathion at intervals of 3 or 4 days. Guthion and a Phosdrin-DDT combination gave moderate control.—Univ. Wisc.

2432. Rao, D. S.
**Effect of certain organic insecticides on the yield of crops.**
*Curr. Sci.*, 1959, **28**: 57-8.

An attempt was made to ascertain the effect of insecticidal sprays on crop yields apart from that due to pest control. Both DDT and Folidol gave increased yields of potatoes, groundnuts and cabbages, but reduced the crop of garden beans.
H.L.

2433. van den Bruel, W. E., and Moens, R.
Nouvelles observations sur les propriétés des hélicides. **(Recent observations on the properties of helicides.)**
*Bull. Inst. agron. Gembloux*, 1958, **26**: 281-304, bibl. 1.

In experiments on the control of slugs (*Agriolimax reticulatus*) under a thick weed cover, calcium cyanamide at 300–500 kg./ha. was very effective, particularly when applied as an aqueous suspension at 2·5 l./sq. m. DNOC was also effective, but heavy dressings were needed. Metaldehyde and *p*-dichloronitrobenzene were less useful against sheltered slugs.

2434. Brett, C. H., and Bowery, T. G.
**Insecticide residues on vegetables.**
*J. econ. Ent.*, 1958, **51**: 818-21, bibl. 23.

Snap beans, tomatoes and collards were dusted at the rate of 30 pounds per acre when they were ready for harvest. Samples were taken immediately after treatment and daily thereafter. All residues showed a linear decrease except for the effect of rainfall. The initial residue on collards was much greater than on snap beans. Snap beans had a greater amount of residue than tomatoes. DDT (10%), methoxychlor (5%), and toxaphene (20%) persisted for at least 12 days on collards and snap beans. There was no detectable toxaphene residue on tomatoes after the ninth day and DDT methoxychlor residues were nearly gone after the 12th day. Lindane (1%) residues were detectable up to the third day on tomatoes, up to the fourth day on snap beans, and only as a trace on collards by the 13th day. Malathion (4%) and endrin (2%) were detectable for 3 days on snap beans, 2 days on tomatoes, and 3 days on collards. Rainfall removed them from the collards on the fourth day. Rainfall effected greater reduction of residues during the early period after application than during later periods. Methods used for determining residues are cited. [Authors' abstract.]—N.C. agric. Exp. Stat.

2435. Kanazawa, K., and Kondo, T.
**Survey on the radioactive contamination of various vegetable crops.**
*Res. Effects and Influences Nuclear Bomb Test Explosion I. Ueno*, Tokyo, 1956, pp. 697-705, from *Ref. Ž.* (*Biol.*), 1958, No. 2, Abstr. 5,956.

Following the H-bomb explosion in 1954, rain became contaminated and the radioactivity of vegetable crops was measured in Japan. The radioactivity of their leaves was considerably higher than that of their roots and fruits. The head and inner leaves of cabbage and Chinese cabbage and the leaves of Welsh onion (*Allium fistulosum*) showed weak radioactivity; the leaf blades were contaminated more than the petioles or main veins. Washing with water or treatment with salt or rice bran removed some of the radioactivity.

2436. Gerber, R. K., Salunkhe, D. K., and Pollard, L. H.
**Gamma radiation of fruits and vegetables: preparation for and mechanics of the treatment.**
Moser, F. Y., and Salunkhe, D. K.
**Effect of gamma radiation on certain chemical changes in the tubers of the Jerusalem artichoke.**
Madsen, K. A., and Salunkhe, D. K.
**Morphological and chemical changes in gamma irradiated carrots and potatoes.**
Wilcox, E. B., and Others.
**Quality appraisal and nutritive changes in gamma irradiated fruits and vegetables.**
From abstracts in *Proc. Utah Acad. Sci.*, 1957-1958, **35**: 168, 168-9, 169-70, 170.

The first paper describes experiments on irradiation in various air environments and with various materials used to enclose the fruit and vegetables within the cans. Production of $CO_2$ in sealed cans was inversely related to the dose of radiation. Certain packing materials produced pungent gases and imparted off-flavours under irradiation. The chief changes in Jerusalem artichokes tubers were: softening, colour changes, more compact appearance of cellulose, crude fibre content decreased, fructose content increased, but inulin and pectin contents decreased, acidity increased. In carrots sprouting declined with increased radiation; irradiated carrots were scored higher by a taste-panel than non-irradiated. The quality of tomatoes and strawberries declined, but that of asparagus and green string beans improved when irradiated in perforated and aerated cans. No loss of quality was observed with cabbages, carrots, sweet corn, and sweet and sour cherries. In general, radiation caused a decrease in ascorbic acid but not of carotene or thiamine contents.—Utah St. Univ.

2437. Brochu, E.
Détermination de la teneur en vitamine C des fruits et légumes de la région de Montréal. **(Determination of vitamin C contents of the fruits and vegetables of the Montreal region.)**
*Rapp. Minist. Agric. Québec, 1957-58*, 1958, pp. 28-9.

The following figures are reported: broccoli, brussels sprouts, cauliflower, parsley and kohl-rabi contained 83–187 mg. ascorbic acid per 100 g.; cabbage, Siamese cabbage, turnip, parsnip, lemon, orange, grapefruit, shallot, spinach and tomato contained 21·1 to 57·1 mg.; pineapple, banana, broad bean, curled lettuce, leek, pea and potato contained 10 to 17·3 mg.; and asparagus, carrot, chicory, cabbage-lettuce, rhubarb and apple were poor in vitamin C.

2438. Ackermann, H.
Der Oxalsäuregehalt im Gemüse und dessen Einwirkung auf den Stoffwechsel. **(The oxalic acid content of vegetables and its effect on the metabolism [of animals].)** [Russian and English summaries 17 lines each.]
*Arch. Gartenb.*, 1958, **6**: 404-44, bibl. 61.

Theories on the formation of oxalic acid in plants and the oxalate content of various vegetables are summarized. The toxicity of oxalic acid, and its influence on the mineral metabolism of animals, is discussed in detail with experimental data based on spinach and rhubarb.—Anst. Vitaminforsch. u. Vitaminprüf., Potsdam-Rehbrüke and Inst. Gemüseb., Grossbeeren.

### *Asparagus.*

(*See also* 2406, 2409, 2599g.)

2439. Ellison, J. H., and Schermerhorn, L. G.
**Selecting superior asparagus plants on basis of earliness.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 353-9, bibl. 5, illus.

Plants selected as having 5, or more than 5, large spears that had emerged on the first day of harvest produced respectively 42% and 94% higher yields than control plants (no emerged spears on the first day) during 2 consecutive seasons. Positive correlations were found between early yield (during the first 2 weeks) and total yield. It is suggested that selection of plants for breeding or seed production should be based on a high number of large spears emerging at the start of the harvesting season.—Rutgers Univ., New Brunswick, N.J.

2440. Grogan, R. G., and Kimble, K. A.
**The association of *Fusarium* wilt with the asparagus decline and replant problem in California.**
*Phytopathology*, 1959, **49**: 122-5, bibl. 5, illus.

The most prominent pathogen concerned was *Fusarium oxysporum* f. *asparagi*, which was present in the soil to a depth of 5 ft., and most abundant at 2 ft. Complete control was given by steam sterilization of the soil, and the pathogen was almost eliminated by fumigation with either CBP 55 or chloropicrin. EDB was fairly satisfactory, but DD was virtually ineffective.—Univ. Calif., Davis.

### *Brassicas.*

(*See also* 2359, 2406, 2505, 2600 l.)

2441. Lingle, J. C., and Sciaroni, R. H.
**Manganese in brussels sprouts.**
*Calif. Agric.*, 1959, **13**(2): 9, illus.

The leaves of stunted and chlorotic brussels sprout plants contained abnormally high concentrations of Mn, which were attributed to low soil pH. Applications of agricultural dolomite (4,000 and 8,000 lb. per acre) or of high-magnesium hydrated lime (at 1,000 and 2,000 lb. per acre) were slow to affect soil pH, but growth was improved and preliminary analyses showed a sharp reduction in leaf Mn contents.

2442. Trebušenko, P. D.
**Increasing the yields of cabbage in the north.** [Russian.]
*Doklady vsesojuz. Akad. selsk. Nauk*, 1958, **23**(10): 21-4, bibl. 4.

Near the Arctic circle only early cabbage varieties are usually grown. To grow more productive mid-season varieties such as Slava the seed should be sown early (late March at 66° N.), and the seedlings raised at temperatures above 15° C. With the onset of long days (late April, early May) short 10-hour days (from 7 a.m. to 5 p.m.) should be introduced for a month before planting out. Higher temperatures and a short day-length combined with an increased activity of short-wave light rays induce vegetative growth, heading and the accumulation of storage materials in plants.

2443. Le Saint-Quervel, A.-M.
**Variations in free amino-acids, soluble carbohydrates and organic acids in young plants of winter cabbage during a period at 5° intended to harden them to frost.** [French?]
*C.R. Acad. Sci., Paris*, 1958, **247**: 1031-4, from abstr. in *J. Sci. Food Agric.*, 1959, **10**: i-216.

Young plants of winter cabbage grown at 5° C. from the 4-5-leaf stage were able to survive a period of 5 hr. at −5° C., followed by thawing at 4° C., whereas unhardened control plants that had been grown at 17–18° C. all died. Chromatographic analyses of the plants showed that: hardened plants contained more proline and less arginine and asparagine; other amino acids were the same as in controls; hardened plants contained a higher concentration of sugars, especially glucose, fructose, and sucrose, and three sugars not present in the controls; hardened plants contained more malic acid; other organic acids were the same as in the controls.

2444. Linser, H., Youssef, E., and Kiermayer, O.
**High content of indolyl derivatives in *Brassica* vegetables.** [German?]
*Z. LebensmittUntersuch.*, 1958, **108:** 358-62, bibl. 17, from abstr. in *J. Sci. Food Agric.*, 1959, **10**: i-216.

They consist mainly of indol-3-yl-acetonitrile with smaller amounts of indol-3-yl-acetic acid. The maximum contents (comprising both substances) were found in the actively growing plants; in the edible parts they amounted to 13·3, 40·5 and 8·0 mg. per 100 g. of fresh wt. for *Brassica oleracea* var. *gemmiflora*, *B. oleracea* var. *sabauda*, and

*B. oleracea* var. *botrytis*, respectively. The maximum amount encountered was 106·8 mg. [See also *H.A.*, 29: 1411.]

2445. (Wiggell, D.)
**Pure calomel suggested for control of club root.**
*Comm. Gr*, 1959, No. 3294, p. 392.

Standard calomel paste treatment applied to cauliflowers in a field infected with club root resulted in a crop with 95·4% marketable heads, while a dip treatment with 2 oz. calomel per pint of water resulted in 98% marketable heads. Various PCNB treatments resulted in a 33% marketable crop. In a subsequent experiment with brussels sprouts an initial growth check was apparent with calomel paste treatment, so that yields averaged only 2·74 lb. per plant. With PCNB, sprout yields averaged 2·95 lb. per plant, while after a 2-oz. calomel dip they averaged 3·79 lb. per plant.

2446. (Hibbs, E. T.)
**Spray at heading for thrips in cabbage.**
*Ia Fm Sci.*, 1958, **13**(6): 18, illus.

The best control of thrips damage was obtained with weekly sprays of heptachlor (½ lb./acre) or parathion (⅓ lb./acre), starting at heading. Caterpillar control was most successful with endrin applied at ¼ lb. per acre, but parathion (⅓ lb./acre) was almost as good. Phosdrin at ⅓ lb. per acre was useful for use near harvest. [See also *H.A.*, 29: 422.]

### *Celery.*

(*See also* 2599o, w.)

2447. Round, K. M.
**New developments in celery production.**
*Comm. Gr*, 1959, No. 3293, pp. 349-51, illus.

Among the aspects discussed with reference to the United Kingdom are the increasing production of leaf celery, the variety New Dwarf White, hot-water treatment of seeds to control *Septoria* leaf spot, pre-sowing rotavation of dieldrin for carrot fly control, gibberellin effects and the manurial programme.

2448. Wolf, E. A.
**Emerald—a new early blight-resistant Pascal celery.**
*Circ. Fla agric. Exp. Stats.* **S-109**, 1958, pp. 7, illus.

The chief merit of the new summer variety, Emerald, lies in its high resistance to *Cersospora apii*. It shows considerable variation in colour, height and rib length and the production of improved strains is desirable.

2449. Ishii, M.
**Celery early blight control.**
*Hawaii Fm Sci.*, 1958, **7**(2): 1-2, illus.

Weekly or fortnightly applications of tri-basic copper at 4 lb./100 gal. or maneb at 2 lb./100 gal. gave excellent control of *Cercospora apii*, without affecting celery quality. Captan and zineb also gave excellent control of early blight, but crop quality and the control of crown rot were lower.

2450. Darby, J. F., and Westgate, P. J.
**Lithium as a fungicide on celery.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 59-62, bibl. 4.

Soil applications of inorganic lithium compounds acted systemically against early blight (*Cercospora apii*). At rates of application of 100–200 lb. per acre, however, yields were reduced by 30%, accompanied by marginal leaf necrosis. Foliar sprays were also applied; lithium carbonate was the least phytotoxic, but it was very phytotoxic at 3 lb./100 gal., the concentration needed to control early and late blight [see also *H.A.*, 28: 2563]. Dilithium ethylene bisdithiocarbamate (34%) at 1 quart/100 gal. gave excellent control of late blight (*Septoria apii*), and was practically non-toxic.—Cent. Fla Exp. Stat., Sanford.

2451. Darby, J. F.
**Fungicides for the control of late blight of celery.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 56-9.

Highly significant control of the small-spot type of late blight (*Septoria apii graveolentis*) and of the large-spot type (*Septoria apii*) was obtained by 15 applications of any of the following sprays: nabam plus zinc sulphate (2 qt. + 0·75 lb./100 gal.), maneb plus ferbam (1 lb. of each per 100 gal.), Dyrene (2 lb./100 gal.), ferbam (2 lb./100 gal.), diammonium ethylene bisdithiocarbamate plus calcium hypochlorite (1 qt. + 1 lb./100 gal.), thiram 75% (1·5 lb./100 gal.), sodium dimethyl dithiocarbamate plus ferrous sulphate (1 qt.+1 lb./100 gal.) and maneb (1·5/100 gal.). Yields with these treatments were nearly twice those of the control plants.—Cent. Fla Exp. Stat., Sanford.

2452. Chambers, S. C.
**Cover spraying for the control of celery leaf spot.**
*J. Agric. W. Aust.*, 1958, **7**: 632-4, bibl. 2, illus.

*Septoria apii* was effectively controlled by sprays of bordeaux (4:4:40) and of Phygon (1 lb./100 gal.). Bordeaux, however, resulted in some leaf discoloration, and growth was somewhat retarded by Phygon. Further trials are proposed.

2453. Freitag, J. H., Aldrich, T. M., and Drake, R. M.
**Aster yellows virus in celery.**
*Calif. Agric.*, 1959, **13**(4): 5, 14, illus.

Aerial applications of DDT-oil sprays to a natural breeding ground for aster leafhoppers (*Macrosteles fascifrons*) have reduced aster-yellows infection of celery to less than 5%.

### *Cucurbits.*

(*See also* 2407, 2472, 2492, 2552, 2599i, 2600f, h.)

2454. Weigle, J. L. R.

**Evaluation of $F_1$ hybrid pickling cucumbers.**

*Diss. Abstr.* 1959, **19**: 1512, being *L.C. Card No. Mic.* 58-5722 of 53 pp.

In trials with 4 varieties and their 6 possible hybrids, some hybrids were at least equal to the best variety in yield and mosaic index, but none was statistically better in all trials. In 1956, however, the hybrid SMR 18-7 × MR 25 performed best when all criteria for evaluation were considered. There were indications that hybrids have a greater capacity for production in years of abnormal growing conditions. The length-width ratios of hybrid fruits were intermediate between those of the parents; thus superior inbred lines which have undesirable length-width ratios may be used in hybridization.—Mich. St. Univ.

2455. Lindner, R. C., Kirkpatrick, H. C., and Weeks, T. E.

**Some factors affecting the susceptibility of cucumber cotyledons to infection by tobacco mosaic virus.**

*Phytopathology*, 1959, **49**: 78-88, bibl. 37, illus.

Light increased and chilling and surfactants decreased susceptibility. Cucumber seedlings grown at 32° C. were much more resistant than those grown at 21° C. This host-virus relationship appeared simpler than with bean or *Nicotiana glutinosa*.—Tree Fruit Exp. Stat. and U.S.D.A., Wenatchee, Washington.

2456. Sijpesteijn, A. K., and others.

**Investigations on the activity of pyridine-2-thiol-N-oxide as a systemic fungicide.**

Reprinted from *Meded. Landbhogesch. Gent*, 1958, **23**: 824-30, bibl. 7, as *Meded. Lab. Phytopath. Wageningen* **180**.

The authors describe trials, from which they conclude that slight systemic protection against *Cladosporium cucumerinum* results from painting a cotyledon of a cucumber seedling with PTO, and that some systemic protection can similarly be afforded against *Botrytis fabae* by application to broad bean leaves. Further, internal seed disinfection can effectively combat *Aschochyta pisi* in peas.

2457. LeRoux, E. J.

**Effects of various levels of calcium, magnesium, and sulphur in nutrient solution on fecundity of the two-spotted spider mite, *Tetranychus telarius* (L.) (Acarina: Tetranychidae), reared on cucumber.**

*Canad. J. Plant. Sci.*, 1959, **39**: 92-7, bibl. 8.

Increasing levels of calcium fed to cucumber decreased the fecundity of *Tetranychus telarius.* When 320 mg. of Ca was supplied per litre of nutrient solution the average progeny per female developing in 35 days was 39% lower than that on plants receiving 160 mg. There was a linear increase in progeny number as the S level was increased from 192 to 384 mg./l., and progeny number was also greater with 42 mg. of Mg/l. than with 28 or 56 mg./l.—Canada Dep. Agric., Harrow, Ont.

2458. Džolova, N. G., and Govorina, G. A.

**Spider mite control.** [Russian.]

*Sad i Ogorod*, 1959, No. 2, p. 35.

In eastern Siberia satisfactory control of spider mites on greenhouse cucumbers was obtained with two applications of NIUIF–100 (thiophos) at 0·05%, and even better control with 50% dithiophos at 0·05 or 0·1%.

2459. Gentle, V. A.

**Red spider mite investigations.**

*A.R. Glasshouse Crops Res. Inst. 1957*, 1959, p. 158.

Fungicides used for controlling cucumber mildew had sufficient acaricidal action to interfere with experiments on mite control. Among new compounds tested for their acaricidal value, fluoracetamide, which had proved a potent aphicide in other trials, did not control *Tetranychus urticae* on french beans even when applied at highly phytotoxic concentrations.

2460. Read, W. H., and Hughes, J. T.

**The determination of residues of Diazinon on cucumbers.**

*A.R. Glasshouse Crops Res. Inst. 1957*, 1959, pp. 150-6, bibl. 3.

Two methods of determining Diazinon residues are described. When cucumbers were treated against greenhouse red spider mite (*Tetranychus urticae* = *T. telarius*) by aerosol applications shortly before harvesting, the Diazinon residues found 24 hours later were sufficiently low for safe consumption.

2461. Gordon, H. S.

**Better returns from polythene covered crops.**

*Grower*, 1959, **51**: 497, illus.

Early growth of marrows was better under 500 gauge polythene tunnels than under 150 gauge film, but the covers should be removed at the start of flowering to allow maximum fruit set. The additional labour of mulching marrows under polythene tunnels was not justified. Runner beans grown with a polythene mulch showed improved growth over unmulched beans.

2462. Cutin, J., and Samish, Z.

**The suitability of certain melon varieties for canning.**

*Ktavim*, 1958, **8**: 337-41, bibl. 4, illus.

Sugar, acid and vitamin C contents and quality were determined for 6 varieties. Baladi and Jokneam Ananas were most suitable, and Hale's Best was distinctly inferior.

2463. Sharples, G. C., and Foster, R. E.
**The growth and composition of cantaloup plants in relation to the calcium saturation percentage and nitrogen level of the soil.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 417-25, bibl. 11.

In pot tests with cantaloupe plants there was no response in yield of dry matter to increases in P or K, but the leaf content of P did increase with increasing soil P content. Magnesium deficiency symptoms appeared when the Mg level in mature leaves decreased to about 0·2% of the dry weight. Soil applications of N significantly increased the K, Ca and Mg levels and decreased the P level in the leaves under conditions of varying ratios of exchangeable Ca to Mg ions in the soil. Limited evidence indicated no differences in mineral content associated with variety, but PMR-6 was more sensitive to Mg deficiency than PMR-45 or CBR-1. Some of the symptoms of crown blight resembled those of N deficiency; plants with crown blight contained less leaf N than normal plants, and P was also reduced in the leaf blades, though it tended to accumulate in the petioles.—Univ. Ariz. agric. Exp. Stat., Tucson.

2464. Kretovič, V. L., and others.
**Nitrogenous compounds in pumpkin sap.**
[Russian, with English summary ½ p.]
*Fiziol. Rast.*, 1959, **6**: 13-20, bibl. 20, illus.

Of the total nitrogen found in the sap, 80–84% was in the form of nitrates and only 5–12% in the form of amino acids and amides. Nitrites were absent. Glutamine and alanine were the most prominent of the 9 amino acids isolated by paper chromatography. Some protein was also found in the sap. The composition of the nitrogen fraction in the sap did not differ when ammonium salts or nitrates were used in the fertilizer.

2465. Hillyer, I. G.
**Effect of growth substances on flowering of cucurbitaceous plants.**
*Diss. Abstr.*, 1958, **19**: 626, being *L.C. Card No. Mic.* 58-2422 of 114 pp.

Staminate flowers of Acorn and Caserta squash were suppressed when maleic hydrazide (25 and 350 p.p.m.) was applied in the greenhouse to plants in early stages of growth. At these concentrations field applications of MH were not effective in late spring and early summer, but later in the season shorter photoperiods favoured chemical suppression. In the greenhouse the greatest suppression of staminate flowers by MH (350 p.p.m.) and NAA (100 p.p.m.) occurred at 60° F. and generally during short days. Pistillate flowers appeared after fewer nodes at 60° than at 70° F., irrespective of the variety and chemical treatment, and their numbers were also reduced by long photoperiods and high temperatures. Morphological studies showed that MH suppressed cell differentiation in apical meristems and the development of pollen grains in the androecia of staminate flower buds. A theory of auxin versus anti-auxin effects on successive phases of flower sex expression in Acorn squash is advanced to explain the selective inhibition of staminate flowers while allowing for the simultaneous development of pistillate flowers.—Mich. St. Univ.

2466. Brantley, B. B.
**Effect of nutrition and other factors on flowering, fruiting, and quality of watermelons and muskmelons.**
*Diss. Abstr.*, 1958, **19**: 925, being *L.C. Card No. Mic.* 58-3139 of 99 pp.

Applications of N increased the number of pistillate flowers and fruits set in watermelons, but the increases were only slight at rates above 100 lb. of N per acre. Total yield, earliness and fruit size were increased by N in a season of heavy rainfall but not in a moderately dry season. The number of fruits set was increased by high N in a dry season, but total yields were reduced by the high percentage of blossom-end rot in developing fruits. When fruits were thinned to 2 or 3 per plant, melon size was increased, but yields were not significantly affected. With muskmelons, rates of 30, 60 and 90 lb. of N increased, but higher rates decreased, the number of perfect flowers, number of fruits set, and total yield. In a moderately dry season a pre-planting application of 30 lb. of N increased the number of perfect flowers formed and of fruits set, and increased early yield; 100 lb. of N had no effect and 250 lb. depressed flowering, fruit set and yield. In a season of high rainfall N at 150 and 250 lb. per acre promoted earlier and more abundant flowering and fruit set than lower levels and increased early yield, but later flowering and fruit set were inhibited by the developing fruits. The removal of perfect flowers promoted subsequent flowering, and the number of fruits set was tripled by the removal of developing fruits. Potassium had no effect on flowering, fruit set, soluble solids or yield of muskmelons or watermelons. Nitrogen increased the soluble solids in muskmelons only where it caused large increases in yield. High N levels and long days increased the number of staminate and perfect flowers as well as the ratio of perfect to staminate flowers in muskmelons. The ratio of staminate to perfect flowers was decreased by NAA under long days. Under short days 0·01 p.p.m. NAA increased the number of both staminate and perfect flowers, but the increase was greater with perfect flowers. Higher concentrations of NAA in short days decreased total flowering.—Purdue Univ.

2467. Nettles, V. F., and Lundy, H. W.
**Results of watermelon fertilizer trials at Gainesville and Live Oak in 1958.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 13-15, bibl. 5.

The application of 1,000 lb. per acre of a 6–8–8 fertilizer produced larger watermelon yields than 500 lb. per acre at both sites. A mixture containing 25% of organic N derived from castor pomace and tankage, applied at planting to plots at Gainesville, increased watermelon yields from 900 (all chemical N) to 955 fruits per acre. No yield differences resulted from fertilizer application in continuous bands along the row as compared with bands one third of the row length at each hill. At Live Oak higher yields were obtained with a single fertilizer application at planting than with two applications; at this site no yield differences were attributable to different N sources.

2468. Grasso, V.
Una caratteristica alterazione di anguria (*Citrullus vulgaris* Schrad.) attribuibile a sfavorevoli condizioni ambientali. (**A characteristic deterioration of watermelons (*Citrullus vulgaris*) attributable to unfavourable environment.**) [English summary 9 lines.]
*Boll. Staz. Pat. veg. Roma*, 1957 (issued 1958), **15**: 285-91, illus.

Watermelons of the variety Bagnocavallo, grown in poor sandy soil without irrigation in two localities of the Rome province, developed watery pulp on ripening, and many of the seeds began to germinate inside the fruits. Other varieties in these localities produced normal fruit. Seeds from the abnormal fruits were planted in calcareous clay soil, and the plants were irrigated during dry weather in late summer. They produced normal fruit. It is concluded that this variety is not suitable for growing in sandy soil.

### *Legumes.*

(*See also* 2034, 2046, 2048, 2049, 2059, 2070, 2071, 2085, 2092s, 2093c, 2357, 2410, 2456, 2599b, r, 2600i, o.)

2469. Buishand, T.
Rassenonderzoek bij bonen. (**Bean variety trials.**) [English summary 1½ pp.]
*Meded. Proefst. Groent. Volle Grond Ned., Alkmaar* **11**, 1959, pp. 71, illus.

Trials in the Netherlands and Belgium with several types of french and runner beans are described, and suitable varieties are indicated. Methods of growing beans in Belgium and the Netherlands were compared, and the value of various types for early production and total yields is discussed.

2470. Atkin, J. D.
**Relative susceptibility of snap bean varieties to mechanical injury of seed.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 370-3, bibl. 7.

Significant varietal differences were found among beans in susceptibility to seed injury. White-seeded varieties were generally more susceptible to injury than coloured. However, the white-seeded variety Streamliner was very resistant to injury.—N.Y. St. agric. Exp. Stat., Geneva.

2471. Gradinarov, L.
**Differential rate of swelling as an indication of qualitative differences in bean seeds.** [Russian, with English summary ¼ p.]
*C.R. Acad. bulg. Sci.*, 1958, **11**: 217-20, bibl. 3, illus.

Seeds of 5 varieties of bean were classified into 3 groups according to the rate of swelling, increase in volume and water-absorbing capacity, when soaked for 1–2 hrs in water at 18° C. Seeds of group I, which began to swell slowly and imbibed the least water, were the best, as shown by germination, resistance to *Bacterium* [*Xanthomonas*] *phaseoli*, and yield, and those of group III the worst. The majority of seeds in all varieties belonged to the intermediate group II.

2472. deZeeuw, D. J., and others.
**The effects of storage of vegetable seeds treated with fungicides and insecticides on germination and field stand.**
*Plant Dis. Reptr*, 1959, **43**: 213-20, bibl. 11.

Field stands of peas, beans and cucumbers, in 3 years' tests of numerous materials, showed that organic fungicides alone or in combination with certain insecticides were superior to mercury compounds and to insecticides alone. The insecticides, as a group, were injurious to stands of beans, but had little deleterious effect on pea or cucumber emergence; damage did not appear to be increased by storage. The phytotoxicity to peas and beans of the volatile-type mercurial materials increased with length of storage. Germination tests did not reflect the injury noted in field plantings.—Mich. agric. Exp. Stat., E. Lansing.

2473. Skiles, R. L., Barros N., O., and Cardona Álvarez, C.
Efecto protector del tratamiento de semillas de fríjol con fungicidas, contra pudriciones radiculares. (**Protective effect of seed treatment of beans with fungicides against root rots.**)
*Rep. III Reun. interamer. Fitogen. Fitopat. Ent. Edafól., Bogotá 1955*, 1958, pp. 224-5.

In Colombia 5 varieties of bean seeds were each treated with 9 fungicides. Results over 4 seasons showed an average increase of only 3–5% in the germination of the treated seeds over the controls, possibly for lack of a suitable sticker. For most varieties Rootone gave the best results, followed by Arasan and Semesan Bel, but there were varietal differences in response.

2474. Buishand, T.
Standruimte van stamslabonen voor machinale pluk. **(Spacing of runner beans for machine picking.)** [English summary ½ p.]
*Meded. Proefst. Groent. Volle Grond Ned., Alkmaar* **13**, 1959, pp. 12, illus.

Spacing bean rows at 80 cm. for mechanical harvesting did not reduce yields by as much as was expected when compared with normal spacing (40 cm.). Yields of stringless Dubbele Witte at 80×6 cm. from small plots averaged 13 tons per ha. An application of nitrochalk (500 to 600 kg./ha.) is recommended on poor soils. Stringless Dubbele Witte is not well suited to machine picking, and Processor and Imuna, which are suitable, are of poor quality.

2475. Hutchinson, F. E.
**Higher rates of phosphorus pay off in snap bean production.**
*Me Fm Res.*, 1959, **6** (4): 12-13, illus.

Trials were carried out in 1957-58 on an infertile sandy loam, phosphorus being applied at 6 levels varying from 0 to 300 lb. $P_2O_5$ per acre, with 50 lb. N and 100 lb. $K_2O$. Over the two years the average yield for each rate of P was significantly higher than that of the next lowest, with only one exception. The average for the 300-lb. rate was more than 4 times that for the plots with no P. H.L.

2476. Ehrler, W. L., Lange, A. H., and Hamner, K. C.
**The effect of nutrient balance on the uptake-transport of calcium and phosphorus by bean plants.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 365-9, bibl. 11.

Contents of $P^{32}$ and $Ca^{45}$ in bean tops were dependent on the amount of each material in the substrate. Uptake of Ca was related to the amount of P in the solution, but P uptake seemed to be independent of Ca supply. The amount of P in the tops was dependent on the amount of Mg in the nutrient solution, but was not related to amounts of K, sulphate or nitrate.—U.S. Salinity Lab., Riverside, Calif., etc.

2477. Romney, E. M., and others.
**Influence of calcium on plant uptake of $Sr^{90}$ and stable strontium.**
*Soil Sci.*, 1959, **87**: 160-5, bibl. 14.

Additions of Ca reduced Sr 90 and Sr uptake by beans from nutrient solutions. Added $CaCO_3$ and $CaSO_4$ reduced Sr 90 and Sr uptake from an acidic, Sassafras sandy loam that was low in native Ca supply. Levels normally applied to this type of soil under good management (2 to 5 tons an acre) were most effective. Neither form of applied Ca reduced $Sr^{90}$ or Sr uptake from a neutral, highly fertile Hanford sandy loam, or from an alkaline-calcareous sandy loam. It appears that further additions of Ca will provide little protection against crop uptake of the radiostrontium fission products from Ca-rich soils. The Sr/Ca atom ratios and distribution factors for beans were dependent upon the concentration of these cations in the nutrient substrate and on the method of assessing plant available Sr and Ca. When adequate levels of Ca were present for plant needs, the Ca content of the plant reached a maximum concentration. Upon further additions of excess Ca, the absorption of Ca proceeded at a reduced rate relative to the rate of Sr absorption, and a discrimination occurred in favour of Sr uptake. [From authors' summary. See also *H.A.*, 29: 1034.]—Univ. Calif., Los Angeles.

2478. Bukovac, M. J., Wittwer, S. H., and Gaur, B. K.
**Some factors influencing the response of the bean (*Phaseolus vulgaris* L.) to gibberellin.**
*Quart. Bull. Mich. agric. Exp. Stat.*, 1958, **41**: 296-302, bibl. 6.

Gibberellin applied to bean seedlings 9 and 12 days old resulted in greater epicotyl extension but less leaf expansion than when it was applied to 6-day-old plants. Elongation of the epicotyl was directly related to the interval between application and removal of the treated primary leaf. The effect of GA on epicotyl elongation was not affected by pH at values between 3·5 and 9·5. Tween 20 resulted in a significant increase in the effectiveness of GA.

2479. Gaskins, M. H.
**Gibberellins and their effects on yield and quality of beans (*Phaseolus vulgaris*) and southern peas (*Vigna sinensis*).**
*Diss. Abstr.*, 1958, **19**: 927-8, being *L.C. Card No. Mic.* 58-3491 of 106 pp.

A slurry treatment of 10% methyl cellulose containing 0·04 or 0·2% potassium gibberellate did not affect germination or seedling growth of Contender beans. At the higher level of seed treatment the number of bean plants was reduced, seedling growth was distorted and yields were reduced. A spray of 10 p.p.m. GA applied in the spring at the first trifoliate leaf stage increased the early yields of beans by 25% [see also *H.A.*, 28: 2522], but total yields were not significantly increased. A second foliar application of 10 p.p.m. applied 10 days after the first resulted in yields similar to those of the controls. The application of 20 p.p.m. GA in the autumn depressed bean yields. Treatments did not cause great changes in the sugars, dry matter, starch or ascorbic acid contents of beans. Crude fibre was higher in beans when GA sprays were applied, but with this variety

Stringiness was not increased. Storage behaviour of beans was not affected.—Univ. Fla.

2480. Rai, G. S., and Hamner, C. L.
**Some observations on the growth regulating properties of 4-thianaphtheneacetic acid.**
*Quart. Bull. Mich. agric. Exp. Stat.*, 1958, **41**: 388-94, bibl. 7, illus.

At 500 p.p.m. 4-thianaphtheneacetic acid significantly depressed the vegetative growth of bean plants, but at 0·5, 1, 5 or 10 p.p.m. it stimulated the growth of tomato seedlings.

2481. Postlethwait, S. N., and Curtis, R. W.
**Histology of malformations produced on bean plants by culture filtrate of *Aspergillus niger*.**
*Amer. J. Bot.*, 1959, **46**: 31-5, bibl. 12, illus.

Stem and petioles exhibited curvatures, increased diameter, reduced length and irregular protrusions, due to an apparent partial loss of polarity of the cells in actively growing regions. The effect was local, and, after treatment ended, those parts produced from the apical meristem matured normally.

2482. Chang, Y.-O., McAnelly, C. W., and Vaughn, J. R.
**A comparison of the amino acid content of beans produced from healthy and *Fusarium* root rot infected plants.**
*Plant Dis. Reptr*, 1959, **43**: 437-8, bibl. 2.

On a dry-weight basis bean seeds produced by healthy plants contained more crude protein and as much or more of the 10 amino acids considered than did those from infected plants. On a 16% N basis the content of some of the amino acids was higher in seeds from infected plants. [From authors' summary.]—Wyo. agric. Exp. Stat., Laramie.

2483. Yarwood, C. E.
**Virus infection and heating reduce smog damage.**
*Plant Dis. Reptr*, 1959, **43**: 129-30, bibl. 3, illus.

On Pinto bean leaves infected by tobacco mosaic virus a zone of uninjured tissue surrounded each virus lesion, under conditions where the non-infected portions of the leaves were severely injured by smog. Leaves that had been dipped in water for 5 to 20 seconds at 50° to 55° C. showed no smog damage or showed less than unheated leaves. [Author's abstract.]—Univ. Calif., Berkeley.

2484. Baggett, J. R., and Frazier, W. A.
**Disease resistance in the runner bean *Phaseolus coccineus* L.**
*Plant Dis. Reptr*, 1959, **43**: 137-43, bibl. 23, illus.

Six varieties of runner bean were infected by only 2 strains of alfalfa mosaic virus out of 27 virus inocula tested. Resistance to halo blight (*Pseudomonas phaseolicola*), bean rust (*Uromyces* spp.) and *Fusarium* root rot was also apparent.—Ore. St. Coll., Corvallis.

2485. Mitchell, J. W., and others.
**Absorption and translocation of the F-17 antirust complex by bean plants and subsequent effect on the rust fungus, *Uromyces phaseoli typica*.**
*Plant Dis. Reptr*, 1959, **43**: 431-6, bibl. 7.

Bean rust was controlled under field conditions with 4 applications of an aqueous spray mixture containing 1,100 p.p.m. of the solids obtained from a *Streptomyces cinnamomeus* f. *azacoluta* culture filtrate. Young plants that were naturally infected and showing rust symptoms at the time of the first spray recovered, grew vigorously and produced fruits, while the untreated controls failed to grow and did not fruit. During cloudy, rainy weather one application of the 1,100 p.p.m. aqueous mixture reduced disease incidence by 99%, while during sunny, dry weather about 10 times this concentration was required. The therapeutic effect of partially purified filtrate solids was 10 to 20 times that of the unpurified solids. The anti-rust complex in this filtrate was absorbed by the leaves, stems and roots. Stem translocation was mainly upward through the plant and in a proximal to distal direction in leaves. [From authors' summary]. U.S.D.A., Beltsville, Md, and Peoria, Ill.

2486. Wilson, E. M.
**Aspartic and glutamic acid as self-inhibitors of uredospore germination.**
*Phytopathology*, 1958, **48**: 595-600, bibl. 10, illus.

These two amino acids, produced by uredospores of bean rust (*Uromyces phaseoli*), were present in the tissue of bean leaves surrounding the rust pustules, protecting these areas from re-infection, but this protection was counteracted at or below 16° C. Re-infection was increased by 50–100 p.p.m. of coumarin or by 9·2 p.p.m. of dinitrophenol, but not by IAA up to 10 p.p.m. or by gibberellic acid up to 1,000 p.p.m.—Univ. Calif., Berkeley.

2487. Genung, W. G.
**Investigations for control of insects attacking the pods of table legumes.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 25-9, bibl. 10.

Applications of Phosdrin, Guthion, thiodan, heptachlor, dieldrin and Delnav have all been effective against plant bugs on beans. Control of various lepidopterous larvae feeding externally was obtained with thiodan, toxaphene and Phosdrin.—Everglades Exp. Stat., Belle Glade, Fla.

2488. Taylor, C. E.
**The bean stem maggot.**
*Rhod. agric. J.*, 1958, **55**: 634-6, bibl. 1, illus.

Control of *Agromyza phaseoli* may be effected by sprays of 0·05% DDT, 0·02% Diazinon, 0·03% dieldrin or 0·025% parathion. The first spray should be applied 3 days after germination, the second 3 days later, and the 2 further sprays given at 7-day intervals. Seed dressings are also giving promising results [see *H.A.*, 27: 3014].

2489. Benavides G., M.
Control de *Empoasca* en fríjoles. **(Control of *Empoasca* on beans.)**
*Rep. III Reun. interamer. Fitogen. Fitopat. Ent. Edafól., Bogotá* 1955, 1958, pp. 277-8.

In a comparison of 10 insecticidal dusts and one emulsion for controlling bean leafhoppers (*Empoasca fabae*) the best results were given by 5% DDT dust at 1·5 kg. of active substance per ha. and by endrin as an 18·5% emulsion at 0·5 kg. per ha., the former being the less toxic to the bean plants. Good control was also given by 3% DDT dust at 1 kg. of active substance per ha., and by 10% toxaphene dust at 3 kg. of active material per ha.

2490. Baranowski, R. M.
**Serpentine leaf miner control on pole beans.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 29-31, bibl. 6.

In comparative trials Diazinon at 2% or 3% gave significantly better control of *Liriomyza pusilla* than 2% parathion. The action of Diazinon was affected by the material applied with it, and the best results were obtained with 2% Diazinon in sulphur. There was an indication that Diazinon dust should not be applied with maneb. When 2% parathion was applied with 3½% maneb and sulphur, leaf miner control was 44%, but control was only 22% when 5% DDT was added to these materials. This may be a result of a disturbance of the balance between the miner and its parasites. —Sub-trop. Exp. Stat., Homestead.

2491. Rimes, G. D.
**Red spider control. (Preliminary report of experiments.)**
*J. Agric. W. Aust.*, 1958, **7**: 619-20, bibl. 1, illus.

*Tetranychus telarius* on Westralia beans was successfully controlled by Metasystox (1 pint/125 gal.), Trithion (1 lb./100 gal.) and Diazinon (4 pints/100 gal.). Turbomist application of these materials to apple trees also gave excellent mite control.

2492. Lewis, W. E.
**Refrigeration and handling of two vegetables at retail: green snap beans and southern yellow summer squashes.**
*Mktg Res. Rep. U.S. Dep. Agric.* **276**, 1958, pp. 6, bibl. 5.

Beans held at 32° or 40° F. for 10 days became russeted and otherwise discoloured during the succeeding 1-day period at room temperature. Even after only 5 days' cold storage at these temperatures the same trouble occurred, and sprinkling did not help matters. Beans held at 32° or 40° F. for 4 days remained relatively free of discoloration after 1 day at room temperature. Other temperatures were also tried. A temperature of 45° F. is recommended for storing beans, since lower temperatures predispose them to discoloration and higher temperatures to flabbiness and decay. Sprinkling at this temperature helps to retain freshness. Squashes benefited from refrigeration, and either an ice-bed rack or mechanical refrigeration with sprinkling gave the best results when either straight neck or crook neck squashes were displayed for 3 days. It is further recommended that squashes displayed during the day should be refrigerated at night.

2493. Torfason, W. E., and Nonnecke, I. L.
**A study of the effects of temperature and other factors upon the germination of vegetable crops.**
*Canad. J. Plant Sci.*, 1959, **39**: 119-24, bibl. 9.

Pea germination was significantly reduced as the temperature was lowered from 40° to 35° F. The duration of exposure had little effect on overall average germination. There were varietal differences in response to exposure time and temperature. It is concluded that peas will tolerate relatively long exposure to temperatures as low as 40° F., in the absence of pathogens.—Canada Dep. Agric., Lethbridge, Alberta.

2494. Karr, E. J., Linck, A. J., and Swanson, C. A.
**The effect of short periods of high temperature during day and night periods on pea yields.**
*Amer. J. Bot.*, 1959, **46**: 91-3, bibl. 6.

The effect of high temperatures during periods of relatively short duration (3–4 days) at various stages following anthesis at the first bloom node was studied in relation to yield of peas at this node. Except for the periods of differential temperature treatments, the plants were maintained in a standard environment room (24° C., light, 12 hrs; 15° C., darkness, 12 hrs). Three different temperature regimes during the treatment periods were studied: high day temperature–standard night temperature (32°–15° C.), standard day temperature–high night temperature (24°–30° C.); and high day and night temperatures combined (32°–30° C.). The data reveal the existence of a relatively well-defined thermal-sensitive period, with maximal sensitivity to high day temperatures occurring at about 9–11 days from full bloom, and maximal sensitivity to high night temperatures occurring about 6–9 days from full bloom. High night temperatures proved more critical, resulting in a maximal reduction of 25% in yield, as opposed to about 8% for high day temperatures. The effect of high day and night temperatures combined tended to be roughly additive. [Authors' abstract.]—Ohio St. Univ., Columbus.

2495. BARBER, H. N.
**Physiological genetics of *Pisum*. II. The genetics of photoperiodism and vernalisation.**
*Heredity*, 1959, **13**: 33-60, bibl. 52.

Late varieties of peas (which react positively to vernalization) possess a dominant, *Sn*, gene which causes later flowering by inducing a response to photoperiod and vernalization. It is suggested that this effect is caused by the production of a flower-delaying substance (colysanthin). This substance must be destroyed before flowering can take place, and this occurs preferentially at low temperature or in long days. Other effects of the *Sn* gene are to raise the node at which the first leaf with 4 leaflets is produced, and to reduce slightly the growth in length of the stem. Two other gene systems which control flowering are described. [For Part I see *H.A.*, 26: 607; see also 29: 453.]—Univ. Tasmania.

2496. BRIAN, P. W., HEMMING, H. G., AND LOWE, D.
**Effect of gibberellic acid on rate of extension and maturation of pea internodes.**
*Ann. Bot. Lond.*, 1958, **22**: 539-42, bibl. 4.

Gibberellic acid (GA) does not delay maturation of pea internodes; on the contrary, maturation (i.e. cessation of extension) takes place slightly earlier. Thus the increased length of internodes resulting from GA treatment is due entirely to increased rate of extension. In this experiment, GA treatment of plants accelerated the visible production of the first flower bud by about 4 days: the node bearing the first flower was not altered. The total number of flower buds produced by the end of the experiment was increased as a result of GA treatment, but many of those first formed on plants receiving high doses (1–10 μg.) withered before opening. [Authors' abstract. For earlier work see *H.A.*, 28: 2101.]—Akers Res. Lab., I.C.I., Welwyn.

2497. MOORE, T. C., AND BONDE, E. K.
**Interaction of gibberellic acid and vernalization in the dwarf Telephone pea.**
*Physiol. Plant.*, 1958, **11**: 752-9, bibl. 12, illus.

The K salt of gibberellic acid (GA) was used at ·5 mg./l. either before or after 10, 20 or 30 days' cold treatment of one series of seeds. In a second series the GA treatment was omitted, in a third it was applied without vernalization, and control seeds were untreated and unvernalized. Vegetative growth was stimulated by the 10-day vernalization, with or without GA, but most strongly when followed by GA. The longer treatments did not markedly affect growth except when followed by GA treatment. Flower induction resulted from the 20- and 30-day vernalizations, but not from the 10-day treatment. When GA was applied before 20- or 30-day cold treatment, the reproductive effect of the latter was reduced, and, when applied after it, the effect was one of devernalization. [For earlier work see *H.A.*, 29: 454.]—Univ. Colorado, Boulder.

2498. TEŠIĆ, T.
Suzbijanje graškovog žiška u polju. (**Control of *Bruchus pisorum* in the field.**) [English summary ½ p.]
*Zasht. Bilja*, 1957, No. 44, pp. 89-98, bibl. 10, [received 1959].

Spraying the peas during flowering with lindane, BHC, Diliden (BHC+lindane) or toxaphene gave good control of the weevil, but reinfestation occurred. The early sowing of a bait crop to attract the insects, in addition to spraying, is recommended.

2499. GOULD, H. J., AND LEGOWSKI, T. J.
**Timing sprays for control of pea moth.**
*Agriculture, Lond.*, 1959, **65**: 611-14, bibl. 1.

Experience indicates that adequate control of the pea moth (*Laspeyresia nigricana*) is not obtained by spraying with DDT once at the flowering stage and again about 17 days later, but that a further spray later is necessary. The authors consider that to ensure efficient treatment the actual appearance of the moths will have to be looked for, and spraying timed accordingly. DDT affords reasonable protection as, probably, do Rogor (0,0 dimethyl S(N-methylcarboxamido methyl) phosphorothiolothionate) and parathion, but Rogor is more expensive and parathion is more toxic to mammals. DDT was applied in trials in Essex either as a 15% emulsion at 13½ pts in 100 gal. water or as a concentrate spray at 5 gal. per acre. The use of the concentrate is promising.

2500. THOMAS, C. A., Jr., AND CHAMBERLAIN, W. F.
**Response of the pea aphid to chemical repellents.**
*J. econ. Ent.*, 1959, **52**: 106-9, bibl. 4.

In field tests none of 4 repellents tried materially reduced the populations of pea aphid (*Macrosiphum pisi*).—S.C. agric. Exp. Stat., Clemson.

### *Mushrooms.*

(*See also* 2599 l, p, 3070.)

2501. FLEGG, P. B.
**Some aspects of the compost and casing layer in relation to fruiting of the cultivated mushroom.**
*A.R. Glasshouse Crops Res. Inst. 1957*, 1959, pp. 108-15, bibl. 5.

Mushroom compost contains considerable quantities of soluble salts ranging from 5 to 8% and increasing towards the end of cropping. The casing layer, either soil or peat/chalk mixtures, has a lower soluble salt content, usually less than 1%. Movement of salts from the compost into the casing layer takes place irrespective of the presence of mushroom mycelium and seems to be a result of physical processes. Mycelial growth in pure culture is adversely affected by increased salt concentrations, and the addition of salts to the casing soil delays cropping and reduces the number of mushrooms formed. There is insufficient evidence yet to show whether the difference in salt concentrations and related moisture stress between compost and casing layer is directly connected with sporophore initiation and development. [From author's conclusions.] M.C.S.

2502. Dredge, A. L. A.
**Commercial prepackaging [of mushrooms].**
*MGA Bull.*, 1959, No. 110, pp. 46-50, illus.

The author describes ¼-lb. and ½-lb. mushroom carton prepacks, and urges the formation of a co-operative mushroom prepacking station to supply self-service stores or, adopting a standard ¼-lb. pack and outer container, to supply wholesale markets in the same way as they are now supplied with normal chip baskets. A most attractive illustration shows ten ¼-lb. prepacks held in just such a container.

### *Onions and related crops.*

(*See also* 2406, 2408, 2414, 2415, 2599q, s, t, w, 2600e.)

2503. Kazakova, A. A.
**Biological characteristics of the Welsh onion.** [Russian.]
*Vestn. s.-h. Nauki*, 1957, No. 5, pp. 56-60, from *Ref. Ž.* (*Biol.*), 1958, No. 2, Abstr. 6,107.

In experiments with Welsh onions (*Allium fistulosum*) grown in Leningrad and Majkop, short-day treatment, irrespective of the place of growth, induced vigorous vegetative growth and retarded the development of the reproductive organs. Branching was reduced after the first 3 years in the Japanese and Russian sub-species. Branching capacity was lowest in the Chinese sub-species and highest in the Russian. After cutting, the number of branches in the second year was reduced in the Russian from 12 to 9, in the Japanese from 8·8 to 7 and in the Chinese from 5·2 to 4. The cellulose content of the leaves increased with age, and that of sugars and vitamin C decreased.

2504. Patil, J. A., Waghmare, D. R., and Patil, A. K.
**Age of seedlings in onions as a rabi crop.**
*Poona agric. Coll. Mag.*, 1958, **49**: 83-6, bibl. 3, illus.

When the transplanting age of Nasik Red onions was increased by 1-week periods from 7 to 14 weeks, there were progressive increases in yields per acre, significant in 2 out of 3 experimental years. Mean weight per harvested bulb increased to a maximum with transplanting at 10 weeks, but the percentage of bolting rose as transplanting age was increased from 9 to 12 weeks. The best age, economically, for transplanting, was 8–9 weeks.

2505. Hori, Y., and others.
**The unfavourable effect of a cabbage crop on a subsequent planting of onions; an example of the decline in soil fertility in vegetable-growing areas. (II.)** [Japanese, with English summary 1 p.]
*J. hort. Ass. Japan*, 1958, **27**: 221-33, bibl. 12, illus.

A basic application of 400–500 lb. of P per acre was required for adequate onion yields following a cabbage crop, and liming was also necessary in strongly acid soils. Onion plants were much more sensitive than cabbage plants to high soil acidity. Growth of both cabbage and onion was inhibited by the presence of 1 p.p.m. Al in a water culture. Abnormal growth of cabbage after cabbage was similar to that induced by Ca deficiency. [For Part I see *H.A.*, 28: 3700.]

2506. Palti, J., Chorin, M., and Nitzani, F.
**Survey of leaf and flower stalk diseases of onions in Israel.**
*Ktavim*, 1958, **9**: 167-75, illus.

Downy mildew, rust and *Macrosporium* blight were investigated. The variety Egyptian was more susceptible than Early Spanish, and the latter more than Riverside, to downy mildew. No clear differences were observed in varietal resistance to the other two diseases. The distribution and periods of development of the diseases are described.

2507. Chorin, M., Palti, J., and Nitzani, F.
**Trials for the control of downy mildew on onions 1953-1956.**
*Ktavim*, 1958, **9**: 139-45, bibl. 9, illus.

Zineb fungicides were consistently better than copper fungicides, and zineb sprays of 0·11–0·17% active material were superior to 7–10% zineb dusts. Satisfactory control required spraying at 7-day intervals, and more frequently under conditions favourable to mildew.

2508. Lo, T. C., and Kuo, M. S.
**Studies on purple blotch of onion.** [Chinese, with English summary 1¾ pp.]
*J. agric. Ass. China*, 1958, No. 24, pp. 48-63, bibl. 11.

As the climate of Taiwan favours the development of the causal organism of purple blotch, *Alternaria porri*, throughout the year, onion growing is severely limited by this disease as well as by pests.

he life history of the fungus is described. No sistant strains of onion were found. Of the ntrol methods investigated 8 applications of ithane Z-78 and 11 of bordeaux mixture proved tisfactory, but, while the former was the simplest prepare, the latter is recommended by reason of s lower cost and local origin. Bordeaux mixture as used at 0·6%, with the first spraying 15 days ter transplanting, followed by the other applica- ons at 10-day intervals. H.L.

509. Vovk, A. M.
**Mosaic virus of onion and its control.** [Russian.]
*Doklady vsesojuz. Akad. seljsk. Nauk*, 1959, **24** (2): 27-31, illus.

n artificial infection trials the virus was not ransmitted to garlic or Welsh onion, and the ultiple-tiered perennial onion was mosaic tolerant. Since in the Moscow and Harkov regions ymptoms appear during the first 10 days in July nd the incubation period is 12–15 days, spraying hould begin during the last 10-day period in June. ive or six weekly applications of NIUIF-100 hiophos] at 5 g. in 10 l. greatly reduced aphid opulations. A 5% solution of anabasine sulphate lus 0·3% soap and dusting with DDT were also ffective. In breeding for resistance to mosaic, ybrids between certain types of onion and Welsh nion showed a high degree of resistance.

10. Howitt, A. J.
**Chemical control of *Hylemya antiqua* (Meig.) in the Pacific Northwest.**
*J. econ. Ent.*, 1958, **51**: 883-7, bibl. 1.

f several materials and methods of application sted against onion maggot, furrow treatments of uthion, Diazinon, ethion, Trithion, V-C 13 and ayer 21/199 have given the best control.—Wash. gric. Exp. Stat.

511. Kazakova, A. A.
**The effect of temperature on the growth and development of onions.** [Russian.]
*Tr. prikl. Botan. Genet. i Selekcii*, 1957, **31** (2): 117-21, from *Ref. Ž.* (*Biol.*), 1958, No. 6, Abstr. 25,055.

The experiments described have shown that onion etts for bulb production should be stored at elatively high temperatures, i.e. 16–20° C., and hose for seed production at lower temperatures, .e. 5–8° C.

2512. Iidis, R., and d'Ersu, A. P.
**Behaviour of some onion varieties in cold store.** [French?]
*Rev. gén. Froid*, 1957, **34**: 1075-8, from abstr. in *J. Sci. Food Agric.*, 1959, **10**: i-98.

Weight loss, sprouts, root length and disease were studied in 12 varieties after storage for 3, 5 and 7 months at 2–3° C. and 70% R.H.

2513. Nikolova, W.
*Suillia lurida* Meig. (Dipt. Helomyzidae)—ein neuer Schädling der Kulturpflanzen. (***Suillia lurida*, a new pest of cultivated plants.**)
*C.R. Acad. bulg. Sci.*, 1958, **11**: 301-4, bibl. 4.

*S. lurida* was found attacking winter grown garlic for the first time in 1952. Winter grown onions and leeks left in the field may also become infested. For control the pre-planting treatment of moistened garlic cloves with 5 kg. of 12% BHC per 100 kg. has given good results, with less off-flavour than when used on onions. A similar treatment with Multamin or Lartal dusts gave similar results without the risk of off-flavour. During the egg-laying period in early spring dusting garlic 3 times at 10- to 15-day intervals with DDT or dieldrin at 30 kg./ha. also proved satisfactory.

2514. van Hoof, H. A.
Oorzaak en bestrijding van de papiervlekkenziekte bij prei. (**Cause and control of white tip disease of leeks.**) [English summary 9 lines.]
*Tijdschr. PlZiekt.*, 1959, **65**: 37-43, bibl. 9, illus.

A *Phytophthora* species was isolated from diseased leeks. Five spray applications of 1% copper oxychloride, 0·5% captan or 0·5% zineb given at 3-week intervals gave fair control.—Inst. PlZiekt. Onderz., Wageningen.

### *Rhubarb.*

(*See also* 2599g, w, 2600d.)

2515. Tolsma, S., and van Hoof, H. A.
Virusziekte in rabarber. (**Virus disease of rhubarb.**) [English summary ¼ p.]
*Meded. Dir. Tuinb.*, 1959, **22**: 115-16, bibl. 1.

Yields from virus-infected plants, expressed as weights and profits, were 23% lower than those from healthy plants. Transmission between plants was slow, and it is suggested that it occurs by spontaneous root grafting.—I.P.O., Wageningen.

### *Root crops.*

(*See also* 2369, 2406-2408, 2412, 2413, 2600a, b, e.)

2516. Nejman, G. B.
**The width of sowing rows for carrots.** [Russian.]
*Doklady vsesojuz. Akad. seljsk. Nauk*, 1958, **23** (10): 13-15.

Carrot seed was sown at 6 kg./ha. in rows 0·9 cm. wide and 45 cm. apart and in bands 3·5–4·0 cm. wide with their centres 45 cm. apart. The saleable crop from the band sowing was 43% higher than that from sowing in the row.

2517. Steffensen, E.
Mikroklimatologiske undersøkelser og tilvekstmålinger av gulrot på Statens Forsøksgard Kvithamar i tiden 4. August–22. Oktober 1947–56. (**Micro-climatic studies and growth measurements in carrots at the State Experiment Station Kvithamar from 4 August to 22 October during the years 1947–56.**) [English summary 1⅓ pp.]
*Forskn. Landbruk.*, 1959, **10**: 57-87, illus.

Three times each day measurements were made of the temperature and relative humidity at different heights and of the solar radiation. Temperatures of the soil at different depths were also recorded. Every 10th day some of the carrots were harvested, and root yields and sugar and dry matter contents determined. Among the climatic factors affecting root yields the best correlation was found between yields and temperature sums during the period from planting to harvesting.

2518. Punter, A. W., and Holden, M.
**The clayburn menace.**
*Comm. Gr*, 1959, No. 3295, p. 469, illus.

Clayburn is a non-parasitic disorder of carrots due to fine silt or clay soil adhering to the root and causing grey-black patches. It is considered to be basically a result of soil compaction, and suggestions for avoiding the trouble are: to avoid soils that run together and hold surface water, to improve soil structure by humus incorporation, and to apply kainit dressings with care.

2519. Kružilin, A. S., and Švedskaja, Z. M.
**The effect of leaves and the root system on the differentiation of buds and growth of biennial seed plants.** [Russian.]
*Doklady Akad. Nauk S.S.S.R.*, 1959, **124**: 1353-6, bibl. 6, illus.

In continuation of earlier work [see *H.A.*, 28: 1473] it has been found that in beets and carrots the presence of leaves is essential for the formation and development of the secondary root system and also for the differentiation of vernalized buds. The secondary root system influences bud differentiation and flower stalk formation only indirectly, since the leaves can ensure that these processes take place in the absence of the root system. This, however, is only possible when sufficient nutrients are available in the root crown, i.e. about ⅓ of the normal root. One third of the main root is also sufficient to ensure leaf formation during vernalization, but bud differentiation requires both leaves and a secondary root system.

2520. Banga, O., and others.
**Selection of carrots for carotene content. IV. Reduction in the gas exchange of the soil.** [Dutch summary ½ p.]
*Euphytica*, 1958, **7**: 247-56, bibl. 8, illus.

A paraffin coating applied to the soil surface of pots, in which carrots were growing, to block gaseous exchange soon stopped primary vegetative growth and the ripening of roots. A constant $O_2$ level of 6% or less in pot soils reduced root thickening and colouring more than primary vegetative growth. Oxygen levels of 9·5% or more did not affect the ripening equilibrium of carrot roots. Atmospheric $O_2$ concentrations did not directly affect the total carotenoid content of stored carrots. During storage the total carotenoids showed an increase if calculated on a dry matter basis, but no increase if calculated on a basis of the crude fibre present. It is concluded that the apparent increase in total carotenoids during storage results from a decrease in dry matter content. [For Part III see *H.A.*, 26: 2823.]—Inst. hort. Plant Breeding, Wageningen.

2521. Carolus, R. L., and Ells, J. E.
**Bitterness in carrots.**
*Amer. Veg. Gr*, 1959, **7** (2): 38-40, illus.

Chemically detectable bitterness in stored carrots became apparent within 2 weeks following a day's exposure to an atmosphere containing 0·01% ethylene. This bitter compound fluoresced when exposed to ultra-violet light, and thus it may be detected in the early stages of formation in the carrot root.—Mich. St. Univ.

2522. Blondin, P.
L'influence des divers écartements des plants sur les récoltes de céleri-pomme. (**The effect of various plant spacings on celeriac yields.**)
*Rev. hort. suisse*, 1959, **32**: 85-7.

The highest average yield of celeriac was produced by plants spaced at 60×25 cm., which was better than the same plant density obtained by spacing at 50×30 cm. There were varietal differences in optimum spacing among the 4 varieties tested. [For earlier work see *H.A.*, 28: 2561.]

2523. Huffaker, R. C., and Wallace, A.
**Sodium absorption by different plant species at different potassium levels.**
*Soil Sci.*, 1959, **87**: 130-4, bibl. 11.

Young radish plants were left for 48 hrs in nutrient solutions in which the 5 levels of Na (partly radioactive) were combined with 6 K levels, the lowest being zero. Absorption curves showed that, at medium levels of Na, uptake of this element would be inhibited by K concentrations approaching 10×normal. More Na was accumulated in the shoots than in the roots, except where both Na and K concentrations were low.—Univ. Calif., Los Angeles.

2524. Schütte, K. H., and Martin, P.
**The influence of certain micro-nutrient deficiencies on the germination rates of radish and millet.**
*Plant and Soil*, 1959, **10**: 299-302, bibl. 1.

Deficiency of B, Cu, Mn or Zn significantly accelerated germination and shoot growth of radish seeds, particularly at 30° C. At 25° C. the effect of Cu deficiency was more marked than that of the other deficiencies. [For influence on wilting, see *H.A.*, 28: 2633.]

2525. Harcourt, D. G., and Miles, J. R. W.
**Broadcast treatments for control of the cabbage maggot in radish, and resultant residues.**
*Canad. J. Plant Sci.*, 1959, **39**: 43-7, bibl. 15.

Heptachlor granules broadcast and raked into a sandy loam, at 3 lb. of toxicant per acre before planting, gave 70–80% control of cabbage root fly in radish planted up to 21 days after treatment. Aldrin gave 58–84% control under the same conditions, but control with chlordane (at 5 lb. per acre) was unsatisfactory. Residues at harvest were below legal limits.—Canada Dep. Agric., Ottawa and Chatham.

2526. Foley, F. B., and Stone, M. W.
**Control of the seed-corn maggot on radishes.**
*J. econ. Ent.*, 1958, **51**: 919, bibl. 1.

In pre-sowing treatment trials against *Hylemyia cilicrura* heptachlor, dieldrin and endrin, in descending order, gave commercial control, but toxaphene and DDT were less effective.—Ent. Res. Div., U.S.D.A.

2527. Palm, E. T.
**Effect of mineral nutrition on invasiveness of *Plasmodiophora brassicae* Wor. and development of clubroot.**
*Diss. Abstr.*, 1958, **19**: 425-6, being *L.C. Card No. Mic.* 58-3057 of 82 pp.

At 40 mg. of Ca per litre of nutrient solution infection of turnips by clubroot was stimulated, but at concentrations slightly above or below this level infection was inhibited. Growth of the host was not affected by increasing Ca concentrations up to 160 mg./l., but clubroot development was stimulated by increasing Ca concentrations up to 100 mg./l. Initial infection was markedly reduced by B concentrations of 2 mg./l. With increasing B concentrations above 8 mg./l. extension growth of aerial parts of turnips was progressively reduced, but root growth was only slightly reduced by B concentrations up to 64 mg./l. Both initial infection and clubroot development increased with increasing K concentrations. Accumulation of K occurred in the clubbed portions of the root, and it is suggested that this is a result of the active growth there, and not because the pathogen is present. An acid pH range was optimum for both initial infection and subsequent clubroot development. At low concentrations B, Li, Cs, Ba and Rb inhibited infection. Field applications of hydrated lime at 4,000 lb. per acre gave better control of clubroot than 1,000 lb. per acre, but the application of 250 lb. per acre stimulated clubroot. The percentage of healthy plants was increased by adding B at a rate of 50 lb. per acre.—Ore. St. Coll.

2528. Doane, J. F.
**A study of the cabbage maggot in Wisconsin and its relation to soft rot in some cruciferous crops.**
*Diss. Abstr.*, 1959, **19**: 1500, being *L.C. Card No. Mic.* 58-7474 of 130 pp.

Seed, furrow, soil and granular surface treatment at 0·4, 1, 2 and 4 lb. a.i. per acre of heptachlor or dieldrin resulted in excellent control of root fly. Heptachlor and aldrin granulated formulations at 1 lb. a.i. per acre gave the most consistent control on turnips when applied in the drills. Soil broadcast treatment with dieldrin or heptachlor at from 2 to 4 lb. a.i. per acre protected swedes from fly attack. —Univ. Wisc.

2529. Varis, A.-L.
**On the importance of sowing time of crucifers in preventing damage caused by cabbage maggots (*Hylemyia* spp.) on the basis of tests made on big-leafed turnip.** [Finnish summary ¼ p.]
*Maataloust. Aikakausk.*, 1958, **30**: 264-70, bibl. 4.

The effect of time of sowing turnips on attack by the cabbage root fly was so variable in south Finland that no recommendations can be given. In north Finland earlier-sown crops were more damaged than late-sown crops, but since yields were lower with late sowings, early sowing is recommended.—Dep. Pest Invest., Tikkurila.

2530. Varis, A.-L.
**On the susceptibility of the different varieties of big-leafed turnip to damage caused by cabbage maggots (*Hylemyia* spp.).** [Finnish summary ⅓ p.]
*Maataloust. Aikakausk.*, 1958, **30**: 271-5, bibl. 5.

Trials of 9 turnip varieties showed that damage at a moderate level was not related to the shape of the root. Where damage was severe, however, round and long-round varieties showed better recovery than flat and flat-round varieties.—Dep. Pest Invest., Tikkurila.

### ***Salad crops.***

(*See also* 2085, 2357, 2599z.)

2531. Jacobs, A., and Taveirne, W.
[Le chauffage électrique du sol en horticulture.] II. Application du chauffage électrique pour le forçage du witloof. (**Electrical heating of soil in horticulture. II. The use of electrical heating for forcing chicory.**)
*Rev. Agric. Brux.*, 1958, **11**: 1137-76, illus.

After discussing chicory culture generally, experiments in forcing by electrical soil heating are described with details of cost and production. The use of installations with single and double cables and with wire netting are described. It was concluded that electrical heating compares favourably with the use of coal, and that cable installations are more suitable for smaller, and wire netting for larger, establishments. An electrical supply of 120–150 watts/m.$^2$ for the centre and 220–250 watts/m.$^2$ for the periphery of the bed is recommended. [For Parts I and III, see *H.A.*, 28: 2849.]—Stat. Génie rural État, Lemberge.

2532. Harrington, J. F., Verkerk, K., and Doorenbos, J.
**Interaction of vernalization, photoperiod and light intensity in floral initiation of endive.**
*Neth. J. agric. Sci.*, 1959, **7**: 68-74, bibl. 8.

Vernalization of germinating endive seed or of young endive plants hastened floral initiation, but at the expense of vegetative growth. High temperatures after vernalization promoted bolting. Long days hastened bolting in both vernalized and non-vernalized plants, again at the expense of vegetative growth. A limited period of short days immediately after sowing also promoted flowering, and it is suggested that such short-day treatment may act as a partial substitute for low temperature. High light intensity had a supplementary effect in promoting bolting but, in contrast to vernalization and long days, caused more rapid vegetative growth than low light intensity.—Lab. TuinbPl., Wageningen.

2533. Thompson, R. C., Doolittle, S. P., and Henneberry, T. J.
**Growing lettuce in greenhouses.**
*Agric. Handb. U.S. Dep. Agric.* **149,** 1958, pp. 22, illus., 15 cts.

Practical advice is given under the following heads: location and construction; varieties for forcing; production and care of seed; rotation and intercropping; soil and its management, including steam sterilization and soil preparation; starting the plants, including soil for seedlings, sowing the seed, seed treatment to improve germination, and transplanting; establishing the plants; general care, including watering, temperature and ventilation; harvesting and marketing; diseases and their control; and pests and their control.

2534. Rodenburg, C. M.
**The identification of lettuce varieties from the young plant.** [Dutch summary $\frac{1}{4}$ p.]
*Euphytica*, 1958, **7**: 241-6, bibl. 3, illus.

It was possible to identify 150 varieties of lettuce at the 3-leaf stage. An illustrated identification key is given for 10 varieties grown in Holland.—Inst. hort. Plant Breeding, Wageningen.

2535. Skinner, C. G., and Shive, W.
**Stimulation of lettuce seed germination by 6-(substituted) purines.**
*Plant Physiol.*, 1959, **34**: 1-3, bibl. 8.

Pre-soaking Early Curled Simpson lettuce seeds in physiologically active concentrations of 6-benzylaminopurine or a synergistic mixture of the purine derivative and gibberellin for only 1 minute will significantly enhance germination, when the seeds are subsequently washed and placed in a dark germinator or at 30° C. for 48 hours. This activation of germination is comparable to that observed by exposure of wetted lettuce seeds to red light. The activation of purine-treated Early Curled Simpson lettuce seeds is augmented by far-red light; but, in contrast, there is no appreciable difference in the rate of germination of these seeds between treatments involving exposure to blue light or complete dark conditions during pre-germination handling. The far-red light also augments the germination of seed pre-treated in a synergistic combination of 6-benzylaminopurine and gibberellin. [Authors' summary.]—Clayton Found. Biochem. Inst. and Univ. Texas, Austin.

2536. Lipp, A. E. G., and Goodall, D. W.
**Nutrient interactions and deficiency diagnosis in the lettuce. V. Potassium content and response to potassium.**
*Aust. J. biol. Sci.*, 1958, **2**: 471-84, bibl. 10.

Lettuce plants grown in sand culture, and receiving N, P, and K at five levels in all combinations, were analysed at different stages of growth for these elements. An attempt was made to relate these analytical data to the subsequent response (in dry matter production) shown by the plants when a further amount of K was supplied. The concentration of K in the plant d.m. was increased by K supply, decreased by N and in some instances by P supply. Interactions among the nutrients were not very marked. Differences in K uptake at different levels of supply were already clear-cut at 11 days from sowing. The response to K could be forecast from a knowledge of the K content of the plant at different stages; for analyses at 37 and 44 days, this relationship was markedly curvilinear. At 29 days, knowledge of the P content enabled the precision of the forecast to be increased; at 37 days, knowledge of the N content was more useful, while at 44 days neither of the other nutrients contributed significantly to the forecast. Little benefit could be obtained from analysing particular organs rather than the entire aerial parts. [Authors' summary For Part IV, see *H.A.*, 28: 2661.]—Univ. Melbourne.

2537. Thompson, R. C., and others.
**Natural cross-pollination in lettuce.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72** 403-9, bibl. 6.

When 2 lettuce varieties (green and red-leaved) wer grown in adjacent rows on the same bed there wa about 1% intervarietal crossing. More pollen moved with the prevailing winds than against them due to insect carriers moving with the winds. Th aximum amount of natural cross-pollination oserved was 2·87%; there were significant fferences in the amount of natural cross-pollina- on occurring during the flowering cycle. When rge masses of pollen from red-leaved plants were mediately adjacent to a block of green test ants, cross-pollination decreased rapidly, but at uneven rate in different directions, up to a stance of 22 ft, beyond which no cross-pollination as observed.—U.S.D.A., Salinas and La Jolla, alif., and Ariz. agric. Exp. Stat., Yuma.

538. VAN HOOF, H. A.
**Bobbelblad bij sla. (Big vein of lettuce.)** [English summary 4 lines.]
*Tijdschr. PlZiekt.*, 1959, **65**: 24-6, bibl. 13, illus.

ettuce and endive plants showing symptoms of big in contained *Olpidium* sporangia in the roots. In e glasshouse healthy lettuce plants developed mptoms when planted in infected soil. [See also *.A.*, 29: 502.]—Inst. PlZiekt. Onderz., Wagen- gen.

539. WHITAKER, T. W., AND OTHERS
**History and development of head lettuce resistant to downy mildew.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 410-16, bibl. 4.

esistance to downy mildew in several lettuce ieties originated from a collection of *Lactuca rriola* (P.I.104854) from Russia. Greenhouse and d resistance has been demonstrated.—U.S.D.A., Jolla, Calif., and Univ. Calif., Davis.

540. STRONG, R. G., AND RAWLINS, W. A.
**Evaluation of four insecticides for the control of six-spotted leafhoppers on lettuce.**
*J. econ. Ent.*, 1958, **51**: 903-5, bibl. 1.

chniques which employed a combination of field d laboratory methods were used to evaluate four secticides—DDT, demeton, malathion, and rathion—for the control of six-spotted leaf- ppers, *Macrosteles fascifrons* (Stål). With equiva- nt dosages of toxicant per acre, malathion was effective at 6 hours as parathion at 12, demeton 24, and DDT at 48 hours after exposure of leaf- ppers to freshly sprayed lettuce plants. Treat- ents were ineffective in controlling leafhoppers days after application of sprays. [Authors' stract.]—Cornell Univ., Ithaca, N.Y.

41. TOMLINSON, J. A.
**Crook root of watercress. I. Field assessment of the disease and the role of calcium bicarbonate.**
*Ann. appl. Biol.*, 1958, **46**: 593-607, bibl. 10.

commercial watercress beds the incidence of ook root (*Spongospora subterranea* f. *nasturtii*) creased with increasing distance from the water urce, was more severe from October to April an from May to September, and affected brown watercress more than green. In laboratory tests and in a small field test increasing concentrations of calcium bicarbonate, from 62 to 540 p.p.m., gave an increasing degree of disease control, although solutions containing 350–750 p.p.m. of calcium bicarbonate had no effect on the germination of zoosporangia or the activity of zoospores. Certain resemblances are noted between the control of crook root by calcium bicarbonate and the control of club root of brassicas by lime.—Nat. Veg. Res. Stat., Wellesbourne.

2542. TOMLINSON, J. A.
**Crook rot of watercress. II. The control of the disease with zinc-fritted glass and the mechanism of its action.**
*Ann. appl. Biol.*, 1958, **46**: 608-21, bibl. 12.

Zinc, applied as zinc sulphate at 0·5 p.p.m., inhibited the growth of *Spongospora subterranea*. A relatively insoluble finely powdered glass frit containing zinc oxide (zinc frit) largely prevented infection by this fungus, when added, at 0·2 g./350 ml., to water in which watercress was growing. In field trials with green and brown watercress, zinc frit applied at 1 lb. and ½ lb. per sq. yd. in September gave effective control of crook root from November to January, after which infection began to build up again. Water in which watercress had been growing was more active than distilled water in extracting zinc from the frit, owing to its $CO_2$ content. Watercress from beds treated with zinc frit was safe for human consumption. The release of zinc from zinc frit is discussed.—Nat. Veg. Res. Stat., Wellesbourne.

### *Spinach.*

(*See also* 2599v.)

2543. KAGAWA, A.
**Studies on flower induction in slow-bolting spinach. (IV) Varietal differences in response to low temperature treatment.** [Japanese, with English summary ¼ p.]
*J. hort. Ass. Japan*, 1958, **27**: 234-40, bibl. 10, illus.

Seed vernalization at about 2° C. for 2 weeks before sowing in the spring, summer or autumn accelerated the time of flower initiation in both slow- and quick-bolting varieties. The order in which different varieties flowered was not altered by low temperature treatment. [For part III see *H.A.*, 28: 3737.]

2544. KLEIN, E.
Das Umfallen des Spinats und seine Abhängigkeit von Bodenbearbeitung und Witterung. **(Damping-off in spinach and its relationship to soil cultivation and weather.)**
*Dtsch. GartenbWirtsch.*, 1958, 6: 209-11, from abstr. in *InformDienst Weihenstephan*, 1959, No. 3, p. 32.

Damping-off in spinach, caused chiefly by *Pythium* spp., is favoured by a good supply of soil moisture and by temperatures of 20–30° C. As seedlings are no longer susceptible after elongation of the hypocotyl, all factors promoting vigorous germination will reduce the disease. Recommendations include soaking the seed for 24 hours and the use of Cerenox, which gave much better control than any of the other seed disinfectants tested.

### *Tomatoes and other Solanaceae.*

(*See also* 2037, 2357, 2406, 2480, 2599a, c-f, h, j, k, n, u, 2600c, g, k, m, n, 2646, 2710d, 3101.)

2545. HÖJBY, H. R.
**Utilization of hybrid vigour in tomatoes: possibilities and limitations.** [Afrikaans and French summaries 10-11 lines.]
*S. Afr. J. agric. Sci.*, 1958, **1**: 249-61, bibl. 5.

At Nelspruit the average marketable yields from 4 hybrids were 149·5% higher than those from 14 varieties, and fruit was picked about 5·4 days earlier. At Kaapmuiden the average yields of marketable fruits from 8 hybrids were 109·1% higher than those from 7 varieties, and hybrid fruit was picked 2·1 days earlier.

2546. GÉORGIÉVA, R., GÉORGIEV, D., AND DIMITROVA, E.
Influence de certains facteurs physiques sur le caractère de l'hérédité dans l'hybridation des tomates. I. Influence du champ magnétique. **(The influence of certain physical factors on the character of heredity in the hybridization of tomatoes. I. The influence of electromagnetic fields.)** [Russian summary 7 lines.]
*C.R. Acad. bulg. Sci.*, 1958, **11**: 221-4, bibl. 9, illus.

Treatment in electromagnetic fields caused material changes in the pollen of *Lycopersicon pimpinellifolium*. In crosses between this species and tomato this treatment resulted in an $F_1$ generation with large fruits and relatively stable morphological and biochemical characteristics.

2547. CANNON, O. S., AND HANNA, G. C.
**New disease resistant tomatoes.**
*Calif. Agric.*, 1959, **13**(3): 7, illus.

Two new strains of Pearson tomato (VF6 and VF11) are resistant to *Fusarium* and *Verticillium* wilts and are similar to Pearson in performance. A *Verticillium*-resistant strain of Red Top has also been developed.

2548. HAYSLIP, N. C., WALTER, J. M., AND KELBERT, D. G. A.
**Indian River. A new disease-resistant tomato of general adaptability.**
*Circ. Fla agric. Exp. Stats.* **S-111**, 1958, pp. 11, illus.

Indian River possesses hereditary resistance to the following fungus diseases:—*Fusarium* wilt, grey leaf spot due to *Stemphylium solani*, early blight (*Alternaria solani*) and leaf mould (*Cladosporium fulvum*). It also shows marked resistance to the physiological disorders known as grey wall, blossom-end rot, crease-stem and bunching.

2549. POLLACK, B. L., AND LARSON, R. E.
**New hybrid tomato for early market.**
*Science for the Farmer*, 1958/59, **6**(3): 14, illus.

Penna 103 is a new $F_1$ hybrid tomato which is claimed to be early, high-yielding, disease-resistant and of good quality. It can be staked, trellised or grown on the ground.

2550. STEVENSON, E. C., AND TOMES, M. L.
**The commercial potential of the dwarf tomato.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 385-9, bibl. 3, illus.

In a comparative trial of 5 promising dwarf lines, with Urbana as control, two of these lines produced single picking yields of approximately 12 tons per acre, and total yields of over 30 tons per acre at 19,360 plants per acre. The trial showed that Urbana could be planted at a closer spacing than that normally used. The possible use of these dwarf lines in mechanical harvesting is discussed.—Purdue Univ., Lafayette, Ind.

2551. WINDHAM, S. L.
**Tomato yields not increased by small grain.**
*Miss. Fm Res.*, 1958, **21**(10): 3.

It has been the practice in Mississippi to leave vegetable land fallow over winter, resulting in leaching of plant nutrients and in sheet erosion. To improve these conditions oats and wheat were sown in October as winter cover crops. Yields were recorded for the tomato crop which followed and compared with yields from fallowed plots and plots receiving cow manure or broiler house litter at 15 tons per acre. On a 3-year average no improvement was obtained in terms of increased yields, but experiments will be continued.

M.C.S.

2552. ŠUIN, K. A., LEVENKO, V. I., AND PETROVIČ, P. T.
**Nutrient blocks from sedge tufts.** [Russian.]
*Sad i Ogorod*, 1958, No. 11, pp. 16-19, illus.

Cubes of 22 cm. cut from the tangled root mass of sedges were found to be very durable, hygroscopic containers for tomato plants. They were soaked in a 1:10 solution of cow dung, to each 100 l. of which were added 100 g. $NH_4NO_3$, 350 g. superphosphate, 100 g. KCl, 60 g. $MgSO_4$ and traces of Fe, Cu, Zn, Mn, Mo and B. The best results were obtained when 40-day-old plants were planted in the blocks, which were then sunk half-way into sand-gravel beds in a greenhouse and subsequently supplied with the same nutrient solution at weekly intervals. The blocks also proved satisctory for growing cucumbers and for raising edlings in the open.

553. Lamm, R.
Försök med jordblandningar till plantuppdragning av drivtomat 1954-1956. **(Experiments with soil mixtures for raising glasshouse tomatoes 1954-56.)** [English and Esperanto summaries 16 and 11 lines.]
*Medd. Trädgårdsförs. Alnarp* **119**, 1959, pp. 12, bibl. 11.

ohn Innes compost proved superior to Fruhorfer's standard soil for tomato seedlings. The se of 4-in. pots, as opposed to 3-in. pots, for ising the seedlings resulted in a 6% increase in arly yields.

554. Mil'čin, M. I.
**The reaction of different tomato varieties to light conditions during the seedling stage.** [Russian.]
*Dokl. Mosk. s-h. Akad. im K.A. Timiryazeva*, 1957, No. 28, pp. 355-61, from *Ref. Ž. (Biol.)*, 1958, No. 9, Abstr. 39,314.

n experiments with 5 tomato varieties raised in he winter, with and without supplementary lumination, it was found that the more intensive he leaf colour, the greater was the ability of the lants to assimilate under conditions of inadequate ght.

555. Usik, G. E.
**The effect of different levels of humidity and temperature during hardening of seedlings on tomato yields.** [Russian.]
*Doklady vsesojuz. Akad. selsk. Nauk*, 1958, **23**(10): 16-20.

ot-grown tomato seedlings hardened at low emperature and humidity (in cold-beds) for 15 ays before planting out were more cold resistant nd productive than seedlings kept in hot-beds. ardening of plants at low temperature and umidity slightly retarded growth, but it increased he dry matter content by 1–2%, resulting in ncreased fruit set, reduced flower drop and mproved yields.

556. Hårdh, J. E.
Lannoiteliuoksen merkitys tomaatin istutuksessa. **(The importance of a starter solution for tomatoes.)** [English summary 5 lines.]
*Puutarha*, 1959, **62**: 58-9, illus.

f the soil temperature is under 15° C., young omato plants take up twice as much phosphorus rom a starter solution containing soluble phoshate as from untreated soil.

557. Andreeva, R. A., and Morozova, I. V.
**The effect of heteroauxin treatment of the root system on growth and development in tomato seedlings.** [Russian.]
*Doklady Akad. Nauk S.S.S.R.*, 1959, **125**: 417-19, bibl. 12.

Tomato seedlings were watered with 20 ml./plant of a 20 mg./l. solution of heteroauxin when pricked out at the 2-leaf stage, and were subsequently grown in sand culture with full and half-strength nutrient solutions. The treatment improved general vigour and increased the adsorbing surface of the roots, N and P uptake, photosynthesis and respiration, especially in those plants given the full-strength nutrient solution.

2558. Cooper, A. J.
**A comparison of the yields from single-stemmed and multi-stemmed tomato plants at three planting densities.**
*A.R. Glasshouse Crops Res. Inst. 1957*, 1959, pp. 31-5, bibl. 2.

Single and multi-stemmed plants were compared in N-S rows 2 ft., 3 ft. and 4 ft. apart. Plant spacing within the row was 1 ft. for single- and 4 ft. for multi-stemmed plants. Single-stemmed plants at the closest spacing (21,780 plants/acre) produced the heaviest crop. M.C.S.

2559. Nielsen, B. F.
Mineralstoffer i tomatplanten. **(Mineral constituents of tomato plants.)** [English summary ½ p.]
*Holticultura*, 1958, **12**: 183-9, bibl. 10, illus.

The author's analytical data support the theory of the S-shaped yield curve, which means that the curve of relative nutrient content as a function of increasing yields is U-shaped.

2560. Dunn, R. H.
**A comparison of total and soluble nitrogen, phosphorus, potassium, calcium, and magnesium found in the leaves of tomato plants grown under various levels of nitrogen, phosphorus and potassium in "Haydite" media.**
*Diss. Abstr.*, 1959, **19**: 1501-3, bibl. 2, being *L.C. Card No. Mic.* 58-7198 of 81 pp.

In a nutrient culture trial with 1 spring and 2 autumn crops of tomatoes, increases in the supply of N, P and K were followed by increases in the contents of these elements in whole leaves, leaf blades and petioles. Each increase in N supply resulted in decreases in the leaf contents of P and Ca and in a small increase in leaf K content. Leaf petioles contained more soluble N, but less total N, than leaf blades. In the spring crops increases in P supply resulted in decreased leaf N and Ca and a small increase in K content. Magnesium contents were not affected by P supply. Differences between the total and soluble P contents of blades and petioles were small. Increases in K supply generally resulted in decreases in the Ca and Mg contents of the leaves. Leaf petioles contained from 30 to 60% more total and soluble K than leaf blades. The total and soluble Ca contents of the leaf blades were between 1 and 3 times greater than those of the petioles, while the contents of total and soluble Mg were greater in petioles than in blades. Highly significant positive correlations were found between total and soluble N, P, K and Ca, but there was no close agreement between total and soluble Mg in the leaves. In the spring crop, plants given 100 p.p.m. N produced greater yields and larger numbers of fruit than those grown at 50 and 200 p.p.m.; an increased P supply was followed by a decrease in both number and weight of fruit produced. At 50 p.p.m. N, and with an increase in K supply, there was a decrease in the yield and number of fruits produced, whereas at 200 p.p.m. N an increased K supply was followed by an increase in both the yield and weight of fruit. At 100 p.p.m. N the K concentration appeared to have little effect on weights and numbers of fruit harvested. The optimum nutrient levels for yield and numbers of fruit were 100 p.p.m. N, 100 p.p.m. P, and 200 p.p.m. K.—Ohio St. Univ.

2561. Winsor, G. W., Messing, J. H. L., and Davies, J. N.
**The effect of nutrient concentration in liquid feeds upon crop yields and fruit quality of tomatoes.**
*A.R. Glasshouse Crops Res. Inst. 1957*, 1959, pp. 85-90, bibl. 1.

Tomato plants receiving a uniform P supply were irrigated with a mixture of potassium nitrate and ammonium sulphate at a constant $K_2O/N$ ratio of 1·75, but at single, double, triple and quadruple concentrations, the unit being 75 p.p.m. of N and 131 p.p.m. of $K_2O$. Leaf composition was little affected, but N tended to increase with increasing concentration of the solution, and a similar, but slighter, effect was noted for leaf K. The total yield per plant was significantly higher at the lowest concentration than at the other 3 nutrient levels, but the yield and proportion of top grade fruit rose significantly with increasing N+K. As the nutrient supply appeared adequate at the lowest concentration, the effects on yield and quality may have been physical rather than nutritional, and connected with concentration of soluble salts in the soil. The most concentrated solution reduced soil pH from 7·2 to 5·7.

2562. Winsor, G. W., Davies, J. N., and Messing, J. H. L.
**Studies on potash/nitrogen ratio in nutrient solutions, using trickle irrigation equipment.**
*A.R. Glasshouse Crops Res. Inst. 1957*, 1959, pp. 91-8, bibl. 1.

In 4 nutrient solutions used for tomatoes, a single level of N was combined with 1, 1·5, 2 and 2·5 times as much $K_2O$. The ratio in each treatment remained constant, but in each case the same regulation of supply was adopted, i.e. small amounts at relatively high concentration, followed by increasing amounts at decreasing concentration. It was necessary to modify the standard trickle-irrigation equipment, and the diluters were successfully adapted for experimental work with systems of not less than 100 trickle nozzles per treatment. During the year's trial the higher the $K_2O/N$ ratio, the greater was the production of high-grade fruit and the less common was unevenly or poorly coloured fruit. Shaded plants produced a lower proportion of "blotchy" fruit and a higher proportion of "waxy" fruit than those in full light, and showed greater uptake of major nutrients. The total soluble salt concentration in the soil became maximal mid-way between the trickle nozzles, but K accumulated near the nozzles.

2563. Tagmaz'jan, I. A.
**The effect of complex nutritional factors on the growth, development and productivity of glasshouse tomatoes.** [Russian, with English summary ⅓ p.]
*Fiziol. Rast.*, 1958, **5**:458-72, bibl. 4.

Increased N alone slightly retarded development without enhancing yields. Yields were increased by supplying extra atmospheric $CO_2$. The full treatment of $2(NH_4)_2SO_4$ and $(NH_4)_2CO_3$ in the soil, $CO_2$ in the air and 2,4,5-T sprayed on the flowers retarded vegetative growth, but increased yields and ascorbic acid content, and lowered acidity.

2564. Long, M. I. E., and Winsor, G. W.
**Urea-formaldehyde compounds as slow-acting nitrogenous fertilizers.**
*A.R. Glasshouse Crops Res. Inst. 1957*, 1959, pp. 72-83, bibl. 8.

A methylene ether compound (27·3% N) and 4 methylene urea compounds (37·4–40·6% N) gave higher total crop yields of tomatoes than hoof-and-horn meal at equivalent N levels (12 g. N per pot) when mixed with the prepared soil. The most promising compound, UFT 5 [used in a previous test, see *H.A.*, 28:3772] gave results equal to those from split applications of hoof-and-horn. Methylene ether compounds showed steady mineralization of N over longer periods than methylene urea types, but practical tests with plants have not been of sufficient scope to rule out the possibility of toxicity from their relatively high formaldehyde equivalent.

2565. Volk, G. M.
**Effect of urea nitrogen on nutritional leaf roll of tomatoes.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 69-74, bibl. 3, illus.

Tomato plants growing in nutrient solution did not show symptoms of nutritional leaf roll with nitrate N, but did so when urea or ammonium sulphate was used, and with these treatments Ca uptake was lowest. Plant growth was greatest with nitrate N and least with N as ammonium sulphate. With ea and ammonium sulphate the uptake of both tal N and Ca was low. It is suggested that urea absorbed into the plant unchanged, and that in e process it has a unique effect on the uptake of sociated ions as compared with other forms of N. Fla agric. Exp. Stat., Gainesville.

66. Ikonenko, T. K.
**The relationship between root and foliar nutrition and photosynthesis in plants.** [Russian.]
*Fiziol. Rast.*, 1959, **6**: 95-7, bibl. 20.

hen tomato plants growing in a nutrient solution ith $P^{32}$ were sprayed with 1% urea or 1% $KH_2PO_4$, ey showed a considerably higher P uptake and and K contents. Root respiration and photo-nthesis were also higher. [For earlier work see .A., 28: 2686.]

67. Bensen, D. W.
**Ion balance in tomatoes.**
*Diss. Abstr.*, 1959, **19**: 1499, being *L.C. Card No. Mic.* 58-5671 of 191 pp.

ields of plant tops and fruit of tomatoes grown in nd-solution cultures tended to decrease as the a–K ratio in the substrate increased. At a Ca–K tio of 13 the K supply was adequate in soils, ut not in sand-solution cultures. An increase in e Mg level in the substrate tended to increase elds of tops and fruit, and its effect was most onounced at the highest level of K, or the lowest a–K ratio. The ions involved in ion balance were , Mg, K, Na, N, P, S and Cl, and concentration hanges of any one of these affected the plant ontents of the others. Sodium tended to increase e yields of tomato plant tops when the K supply as low, and an increase of Na in the substrate nded to decrease the cation–anion ratios in -deficient plants. The yields and inorganic omposition of plants grown on 3 sand–clay ineral mixtures were markedly affected by the upply of Ca and K. The largest yields were oduced on montmorillonitic media, but Ca was ore available from kaolinitic than from montmorillonitic-type clay minerals. Yields of tops and ruits tended to be influenced more by soil textural ifferences than by the Ca–K ratios established in he soil. The stem content of Ca was influenced by he degree of Ca saturation and the nature of the oil. The results of a greenhouse pot culture xperiment showed that the yield response produced on light-textured soils by varying Ca–K atios was similar to those observed in sand olution cultures. Yields on heavier-textured soils vere less affected by decreasing levels of K saturation or increasing Ca–K ratios in the soil. At quivalent rates applied in the field, the sulphate vas a more effective source of K than the chloride or the production of maximum yields of fruit. Fruits with the highest content of titratable acid were produced at a level of KCl equal to 200 lb. $K_2O$.—Rutgers Univ.

2568. Hayslip, N. C., and Ozaki, C. T.
**Liming for tomatoes on acid sandy soils.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 390-6, bibl. 5.

There was no advantage in applying mixtures of liming materials to unstaked Manalucie plants compared with single lime sources. Early liming tended to produce better tomato yields than late liming, but differences in marketable fruit were not significant. Liming in one trial produced better yields, a lower incidence of blossom-end rot and higher plant contents of Ca (highest with hydrated lime) and Mg (highest with dolomite) than occurred in unlimed plots. Dolomite was less effective than the other materials in reducing blossom-end rot. Dates of liming did not significantly affect the mineral content of the tissue. Under favourable growing conditions no further responses in yield were obtained by increasing the applications of high calcic lime above 1,500 lb. per acre. Large yield increases were obtained from lime applied only 45 days before transplanting tomatoes.—Indian River Field Lab., Fort Pierce, Fla.

2569. Messing, J. H. L., Hobson, G. E., and Winsor, G. W.
**Magnesium deficiency in glasshouse tomatoes.**
*A.R. Glasshouse Crops Res. Inst. 1957*, 1959, pp. 99-107, bibl. 6.

Two varieties of tomato, Potentate and Immuna, were grown at medium and high soil K levels, and the effects of soil applications or foliar sprays of Mg were determined. Symptoms of Mg deficiency appeared earlier at the high than at the medium K level. Foliar sprays of Mg were much more effective in maintaining normal green pigmentation of the leaves than soil applications, but the Mg content was higher in leaf samples (5th leaf below the top) from soil-treated plots. Despite its marked sensitivity to Mg deficiency the variety Immuna yielded an earlier crop and a heavier total crop than Potentate, with twice as high a percentage of top-grade fruit. M.C.S.

2570. Kirsch, R. K.
**Interrelationships among iron, manganese, and molybdenum in the growth and nutrition of tomatoes grown in nutrient solution.**
*Diss. Abstr.*, 1958, **19**: 626-7, being *L.C. Card No. Mic.* 58-3812 of 82 pp.

Marglobe tomato plants showed differential yield responses to applied levels of Fe, Mn and Mo. Iron counteracted the yield-depressing effect of added Mn, but larger amounts of Fe were required to do this when the Mo supply was increased. The addition of Mo decreased yields at the lower Fe levels, but increased them at higher Fe levels. At low levels of Mo yields increased to a maximum and then dropped as Mn was added; at higher levels of Mo yields continued to increase as Mn was added and no maximum was attained. The Mo supplied tended to accumulate in toxic quantities in the roots at lower levels of Fe, thus causing reductions in yield. Iron additions appeared to reduce Mo uptake and to stimulate its movement from roots to leaves, thus resulting in yield increases. Symptoms of toxicity and deficiency of all 3 elements were observed. It is concluded that there exists a higher-order Fe×Mn×Mo interaction effect in plant nutrition, which affects growth responses to molybdenum.—Ore. St. Coll.

2571. Twyman, E. S.
**The effect of iron supply on the yield and composition of leaves of tomato plants.**
*Plant and Soil*, 1959, **10**: 375-88, bibl. 7.

The plants were grown in nutrient solution and all received 3 doses of Mn at 0·25 mg./l. at 16-day intervals. Fe was supplied at totals of 0·375 mg./l. and of $\frac{1}{2}$, $\frac{1}{4}$ and $\frac{1}{8}$ of this amount. At each Fe level the total amount was divided into either 3 doses at 16-day intervals, 6 at 8-day or 12 at 4-day intervals. Only at the highest Fe level and with the 3 large doses was leaf colour normal. Chlorosis developed to an increasing extent with lower total applications of Fe and with progressive splitting of doses. Symptoms of Mn toxicity followed the same general pattern, but they were absent from plants at the highest Fe level with 16- and 8-day application intervals. The mean dry weight per plant decreased significantly as the total Fe supply decreased, and less markedly with the progressive splitting of doses. The higher the total Fe supply, the higher was the percentage of foliar Fe, but the rise in Fe was accompanied by a fall in Mn, P, Na, Ca and Mg. Young leaves were poorer in Fe, Mn, K, Na, Ca and Mg, but richer in N and P, than older leaves. Small and frequent doses of Fe decreased Na, but increased Mn and P in the leaves.

2572. Ozaki, C. T.
**Factors influencing the toxicity of manganese to tomatoes following the steaming of certain Ohio greenhouse soils.**
*Diss. Abstr.*, 1959, **19**: 1506-8, being *L.C. Card No. Mic.* 58-7165 of 160 pp.

Symptoms of leaf and stem necrosis of tomatoes produced in a nutrient solution at high Mn levels were similar to those occurring after soil steaming, which released water-soluble and exchangeable Mn fractions in Wooster silt loam. Both Mn amounts and steaming injuries were reduced by liming the soil to near neutrality before or after steaming. Symptoms of Mn toxicity were not prevented by the presence of high P concentrations in the nutrient solution. Applications of gypsum did not reduce Mn uptake by tomato plants or sterilization injury. The concentration of soluble Mn in the soil was increased by leaching immediately after steaming, and by the addition of readily-decomposing sucrose. Soil Mn was reduced by the injection of steamed soil with unsteamed soil, but the rate and amount of decrease were insufficient to prevent injury to tomato plants. Varietal sensitivity to Mn was noted. In preliminary studies no consistent differences were found in the Fe contents of injured and uninjured tissues of tomato plants grown in solutions containing high concentrations of Mn. It was concluded that other factors also play a part in the manifestations of "sterilization injury" noted, and that further work on the problem will be necessary.—Ohio St. Univ.

2573. Lingle, J. C., Holmberg, D. M., and Zobel, M. P.
**The correction of zinc deficiency of tomatoes in California.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 397-402, bibl. 4, illus.

Greenhouse tests showed that tomato plants absorbed Zn from Zn–EDTA more readily than from zinc sulphate, when both were applied to the soil. Zinc deficiency caused an increase in the tissue contents of K, Ca and Mg, probably because of stunting of the plants. In field tests with direct-seeded tomatoes neither foliar sprays nor side-dressings of several Zn carriers corrected an existing deficiency. In soil with a low available Zn content, zinc sulphate in the transplanting water was satisfactory in preventing Zn deficiency. Zinc sulphate sprays were more effective than Zn–EDTA sprays, zinc oxide dusts, or zinc sulphate side-dressings when applied later in the growing season to transplanted tomatoes. [See also *H.A.*, 28: 508.] —Univ. Calif., Davis and Woodland.

2574. Koval'skaja, F. M.
**Changes in the salt resistance of plants during development.** [Russian, with English summary $\frac{3}{4}$ p.]
*Fiziol. Rast.*, 1958, **5**: 434-44, bibl. 34.

The ability of plants to resist sudden changes in the salinity of the soil was found to vary considerably during development. With tomato plants this ability was much greater in the flower-bud stage than in the seedling and flowering stages, being lowest in the latter. Slow changes in salinity resulted in the plants becoming adapted. The cause of damage appeared to be alterations in the water imbibition of the protoplasm, which was affected by the nature of the salt ions in the soil. Na and Cl ions induced hydrophily, which decreased gradually with age, but with a sharp minimum at flowering. With this was correlated viscosity. Plants with high protoplasm viscosity were more resistant to high temperatures, plants in the flower-bud stage being especially resistant. Soil salinity reduced the elasticity of the protoplasm and consequently the plants became susceptible to drought.

2575. Malcolm, J. L., and Harkness, R. W.
**The effect of irrigation on the chemical composition of tomato leaves.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 51-3, bibl. 4.

Further results are given from a tomato irrigation trial previously reported [see *H.A.*, 28: 2675]. Leaf analyses showed that where water was deficient, the uptake of P, K and Mg was restricted. At intermediate irrigation levels, minerals (N, P, K, Ca and Mg) were readily available to plants, but there was a tendency for late-season deficiencies, especially of N and K. Leaching occurred with excess irrigation. In general, high leaf Ca was associated with restricted growth or limited nutrient uptake. Both individual leaflets and whole leaves provided suitable samples for determining the effect of irrigation on the nutrient status of tomato plants.—Sub-trop. Exp. Stat., Homestead.

2576. Sîrbu, E.
Unele cercetări asupra proceselor fiziologice la tomate în condiţii de irigare. **(Studies on the physiological processes in tomatoes under irrigation.)** [Russian and French summaries.]
*An. Univ. "C. I. Parhon", Ser. ştiint. natur.*, 1956, No. 11, pp. 183-9, bibl. 7, from *Ref. Ž. (Biol.)* 1958, No. 6, Abstr. 24,663.

Suction pressure, osmotic pressure, transpiration and stomatal movement were measured during the growing season in leaves of irrigated and unirrigated tomatoes. Suction pressure increased during the day, reaching a maximum at 2 p.m., and thereafter slightly declining. It was lower in the irrigated plants, but with increasing age increased in both treatments. The osmotic pressure of the cell sap, always measured between 7 and 8 a.m., was also lower in the irrigated plants and similarly increased as they aged. Transpiration increased during the day, reaching a maximum at midday, and then declined, sometimes sharply, in step with the reduction in temperature and illumination. The stomata, widely open during the day, closed toward the evening in the unirrigated plants, and rather later in the irrigated plants.

2577. Gates, C. T., and Bonner, J.
**The response of the young tomato plant to a brief period of water shortage. IV. Effects of water stress on the ribonucleic acid metabolism of tomato leaves.**
*Plant Physiol.*, 1959, **34**: 49-55, bibl. 8.

It is already known that moisture stress inhibits not only growth and dry weight accumulation of young tomato leaves but also the accumulation by such leaves of nitrogen and phosphorus. The present work has shown that moisture stress also suppresses net increases in the RNA of such leaves. The leaves of moisture-stressed tomato plants possess the ability to incorporate $P^{32}$-labeled phosphate in RNA, even though they do not exhibit any net synthesis of the material. It is concluded that in the leaves of moisture-stressed tomato plants the rate of destruction of RNA may be increased above the rate characteristic of control, non-moisture-stressed leaves. This conclusion is further supported by the experimental fact that osmotically induced moisture stress increases rate of RNA loss in excised tomato leaves. [Authors' summary. For Part III, see *H.A.*, 27: 3579.]—Calif. Inst. Tech., Pasadena.

2578. Ferguson, J. D., Street, H. E., and David, S. B.
**The carbohydrate nutrition of tomato roots. V. The promotion and inhibition of excised root growth by various sugars and sugar alcohols. VI. The inhibition of excised root growth by galactose and mannose and its reversal by dextrose and xylose.**
*Ann. Bot. Lond.*, 1958, **22**: 513-23, bibl. 12, and 525-38, bibl. 17.

Sucrose was the only sugar to support considerable growth; dextrose and laevulose or a mixture of the two supported sustained growth at a lower level. All other sugars and sugar alcohols tested were inactive as carbon sources. The activity of sucrose was not affected by alcohol precipitation, nor was it dependent on the presence of traces of its constituent monosaccharides. Certain sugars, when added to a medium containing the optimum concentration of sucrose, inhibited growth. This is described in more detail in the second paper. Dextrose was more effective than *d*-xylose in restoring growth activity after inhibition by galactose or mannose. Maltose was only slightly active in antagonizing this inhibition, and other sugars and sugar alcohols tested were inactive in this respect. [For Part IV, see *H.A.*, 24: 508.]—Univ. Coll. Swansea and Univ. Manchester.

2579. Bedesem, P. P., Jr.
**Histogenetic effects of 2,3,5-triiodobenzoic acid on the shoot apices and leaf primordia of tomato.**
*Bull. Torrey bot. Cl.*, 1958, **85**: 434-72, bibl. 65, illus.

There were three types of modification of apical meristematic tissue in tomato shoots following treatment with 2,3,5-triiodobenzoic acid (TIBA). No new leaf primordia were initiated at stem apices during treatment, with a few rare exceptions at a late phase of the study. In the youngest leaf primordia present at the time of treatment there was increased procambial development, which resulted in the formation of a continuous vascular layer. Leaflet number and the amount of leaf lobing were also reduced in the youngest primordia which were treated. Morphological and physiological aspects of TIBA-induced modifications are discussed, including the nature of induced ring fasciations.—San Francisco St. Coll., Calif.

2580. Sowell, G., Jr.
**Tomato fungicide testing on the west coast of Florida.**
*Plant Dis. Reptr*, 1959, **43**: 193-7, bibl. 4.

Maneb, nabam+$MnSO_4$, and zineb were equal in disease control and in their effect on the yield and quality of tomatoes grown in the west coast area of Florida. Nabam+$ZnSO_4$ gave disease control equal to that of the other carbamates, but consistently reduced yields. 2,4-Dichloro-6-(*o*-chloroanilino)-S-triazine at 2 lb. 50% wettable powder in 100 gal. gave better control of grey leaf spot (*Stemphylium solani*) than the above carbamates. Tribasic copper sulphate at 4 lb. per 100 gal. plus 100 p.p.m. streptomycin gave better control of bacterial spot (*Xanthomonas vesicatoria*) than streptomycin at 200 p.p.m. or basic copper sulphate alone. Calcium chloride at 4 lb. per 100 gal., as used for blossom-end rot control, is compatible with nabam+$MnSO_4$ or $ZnSO_4$, zineb, Dyrene, DDT and parathion. [For earlier work see *H.A.*, 29: 545.]—Gulf Coast exp. Stat., Bradenton.

2581. Richardson, L. T.
**Effect of insecticides and herbicides applied to soil on the development of plant diseases. II. Early blight and *Fusarium* wilt of tomato.**
*Canad. J. Plant Sci.*, 1959, **39**: 30-8, bibl. 14.

Applications of lindane, 2,4-D and isodrin to young tomato plants increased the development of early blight (*Alternaria solani*), but applications of endrin, MH, NPA, dieldrin, IPC, dalapon, demeton and aldrin reduced lesion counts. Lindane, isodrin and dalapon increased the severity of *Fusarium* wilt, but endrin, aldrin, TCA, DDT and dinoseb reduced it. The application of 2,4-D and MH at different times to an immune variety did not alter its reaction to wilt. With a susceptible variety applications of 2,4-D, started 7 days before inoculation, reduced wilt development, but its severity was increased by post-inoculation treatments. MH increased wilt development at all treatment periods, but its effect was greatest with pre-inoculation treatment. With a resistant variety 2,4-D increased wilt to about the same extent at all times of treatment; MH increased wilt when applied before or immediately after inoculation but had no effect when applied later.—Canada Dep. Agric., London, Ontario.

2582. Corden, M. E., and Dimond, A. E.
**The effect of growth-regulating substances on disease resistance and plant growth.**
*Phytopathology*, 1959, **49**: 68-72, bibl. 14.

A series of naphthalene-substituted aliphatic compounds varied in growth-regulating properties and in capacity to induce resistance to tomato wilt caused by *Fusarium oxysporum* f. *lycopersici*. 1-Naphthalenacetic acid induced the greatest resistance: 4(1-naphthyl)-butyric acid and its ethyl ester gave high resistance; and 3-(1-naphthoyl) propionic acid and its ethyl ester gave moderate resistance. Analogs with 4-carbon side-chains substituted in the 2 position induced only slight resistance. The compounds were assayed for their capacity to inhibit root elongation, promote root initiation, delay leaf abscission, and inhibit mycelial growth of *F. oxysporum* f. *lycopersici*. Only the capacity to inhibit root elongation was directly related to induction of wilt resistance. A working hypothesis is suggested that wilt resistance and inhibition of root elongation are physiologically related through modifications of plant pectic substances by growth regulators. [Authors' summary.]—Conn. agric. Exp. Stat., New Haven.

2583. Williams, P. H.
***Didymella* stem rot.**
*A.R. Glasshouse Crops Res. Inst. 1957*, 1959, pp. 120-2, bibl. 3.

A report that 2,4,6-T increased the susceptibility of tomato plants to *Didymella* stem rot was not confirmed by experimental evidence. Pieces of root taken from infected tomato plants showed no sign of infection unless taken close to the stem. This suggests that *Didymella lycopersici* does not readily invade roots from infected stems. The failure of *Didymella* to become established in unsterilized soil appears to be due to the presence of antagonistic organisms. Isolations of various organisms from glasshouse soils were tested in the laboratory for their inhibitory effect. Certain of these are being grown in soil to test their ability to prevent its colonization by *Didymella*. M.C.S.

2584. Wahl, I., Chorin, M., and Reichert, I.
**Late blight disease of tomatoes in Israel.**
*Ktavim*, 1958, **9**: 153-66, bibl. 30, illus.

The causal organism in Israel was shown to be *Phytophthora infestans*. Copper sprays were efficient in mild attacks but less so in serious outbreaks. Tomato plants were generally resistant to copper damage. Dichlone gave very promising results, and results with captan were also encouraging. Low volume spraying is likely to prove effective.

2585. Rankin, H. W., and Good, J. M.
**Effect of soil fumigation on the prevalence of southern blight on tomatoes.**
*Plant Dis. Reptr*, 1959, **43**: 444-5, bibl. 1.

D-D, and possibly Nemagon, soil treatments increased the incidence of southern blight on tomatoes caused by *Sclerotium rolfsii*. The reason for this is unknown, but it seems probable that, under certain conditions, fumigants affect the biological content of the soil in such a way that the balance between beneficial and pathogenic organisms may be upset.—Ga Coastal Plain Exp. Stat. and U.S.D.A., Tifton, Ga.

2586. Lear, B.
**Application of castor pomace and cropping of castor beans to soil to reduce nematode populations.**
*Plant Dis. Reptr*, 1959, **43**: 459-60.

The application of castor pomace appeared impracticable, and growing castor beans for 60 days before planting tomatoes was ineffective for controlling root-knot nematode, *Meloidogyne javanica javanica.*—Univ. Calif., Davis.

2587. Marlatt, R. B., and Allen, R. M.
**Control of tomato root knot in Arizona with fumigants.**
*Plant Dis. Reptr*, 1959, **43**: 309-10, bibl. 3.

Hot, sandy Yuma Mesa soil was fumigated with ethylene dibromide (EDB), mixed chlorinated $C_3$ hydrocarbons ("D-D" and "Telone"), mixed EDB and D-D ("Dorlone"), and dibromochloropropane at various rates as solid (broadcast) injections 3 inches deep. Fumigants were evaluated by comparing fruit yields and root galling. Analysis of variance showed that EDB at rates of 7 to 10 gal. per acre gave the best performance over a 2-year period. [Authors' abstract.]—Ariz. agric. Exp. Stat.

2588. Saravacos, G., Luh, B. S., and Leonard, S. J.
**Effect of fertilizers on quality and composition of tomato juice.**
*Food Res.*, 1958, **23**: 648-55, bibl. 22, from abstr. in *J. Sci. Food Agric.*, 1959, **10**: i-215.

Tomatoes of the variety Improved Pearson, grown under the same field conditions but with varied treatments of NPK, were canned and the quality and composition of the juice examined. Mineral composition was not affected appreciably, but the P content was slightly higher in the juice from fertilized fruit and flavour was more acid.

2589. Hartman, R. T.
**Effects of growth-regulating substances on the carbon dioxide evolution and post-harvest ripening of tomatoes.**
*Plant Physiol.*, 1959, **34**: 65-72, bibl. 43.

Studies were made of the effects of 11 synthetic growth substances on the post-harvest ripening of mature-green tomatoes. Two compounds, 2,4,6-trichlorophenoxyacetic acid (2,4,6-T) and ammonium thiocyanate, were shown to be effective in shortening the ripening time of green tomatoes by a period of 1 to 4 days. The accelerating substances were most effective when applied at least 6 days before the red stage of ripeness. This appears to correspond to the period before onset of the climacteric rise in respiration. Application of the accelerating substances did not affect constituents of ripened fruits as shown by analyses of pH, soluble solids, ascorbic acid, and pectinmethylesterase activity. A study of the respiratory patterns of individual fruits treated with 500 p.p.m. 2,4,6-T and of untreated fruits revealed that, while the climacteric rise in $CO_2$ evolution appeared earlier in the treated fruits, their climacteric peaks were not higher than those of untreated fruits. As a group, in each of four experiments, the treated fruits evolved more $CO_2$ than did controls during the ripening period. This was apparently a result of the earlier appearance of the climacteric rise in fruits accelerated by the 2,4,6-T. [Author's summary.]—Univ. Mich., Ann. Arbor.

2590. Moghrabi, H. M.
**Physical and chemical changes during the ripening of tomatoes as affected by temperature.**
*Diss. Abstr.*, 1958, **19**: 928, being *L.C. Card No. Mic.* 58-5461 of 65 pp.

Fruits of the Stokesdale variety had consistently higher contents of protopectin and total pectin at 35° C. than at 15°, 20° or 30° C. At 15°, 20°, 30° and 35° C. there were marked drops in fruit firmness and protopectin contents during the first 3 days of ripening. The highest rate of weight loss occurred in fruits exposed to 40° C. when the relative humidity was 23%, and the lowest rate of loss occurred at 15° C. and 87% R.H. Carotenoid formation was most rapid at 20° C., whereas at 35° C. little or no pigment was formed.—Univ. Ill.

2591. Davies, J. N., Massey, D. M., and Winsor, G. W.
**The effect of defoliating tomato plants on fruit composition.**
*A.R. Glasshouse Crops Res. Inst. 1957*, 1959, pp. 53-66, bibl. 12.

Removal of foliage markedly decreased the sugar and dry matter content of the fruit and reduced the concentration of sugars and total solids in the expressed sap. Retention of lateral shoots increased the content of sugars and total dry matter in the fruit. The titratable acid of expressed juices was not affected by the treatments. Severe defoliation resulted in better grade fruit and reduced the proportion of irregularly coloured fruit, but at the expense of a marked reduction in yield. M.C.S.

2592. Cooper, A. J.
**The definition and classification of abnormalities of fruit pigmentation in the tomato variety Potentate.**
*Ann. appl. Biol.*, 1958, **46**: 669-74, bibl. 7, illus.

The need for a detailed classification of the pigmentation abnormalities that occur during the ripening of tomato fruits is discussed and a possible classification is presented. The amounts of the different types of pigmentation abnormality occurring show large annual differences and pronounced short-term fluctuations in any one season. [Author's summary.]—Glasshouse Crops Res. Inst., Littlehampton.

2593. WEDDING, R. T., AND OTHERS.
**Abnormality in tomato fruits.**
*Calif. Agric.*, 1959, **13** (1): 5, 14, illus.

In tomatoes grown at various N levels and given hormone sprays (4-chlorophenoxyacetic acid or Gibrel) there was no consistent, significant effect of either N or hormone on the production of puffy or pointed fruits. Applied in the autumn, 4-CPA did not significantly increase the percentage of abnormal fruits. In all other experiments 4-CPA resulted in significant increases in both pointed and puffy fruits, as well as in increases in early yield. Gibrel, in a single test, had no effect on pointed or puffy fruit but decreased early yield. There was also a tendency for rates lower than 100 lb. of N per acre to result in higher percentages of abnormal fruit.

2594. WINSOR, G. W., AND MASSEY, D. M.
**Studies of the composition of tomato fruit.**
*A.R. Glasshouse Crops Res. Inst. 1957*, 1959, pp. 40-52, bibl. 4.

In Potentate tomatoes moderate irregularity of fruit shape was not accompanied by abnormal composition. Multi-locular fruit, however, showed decreasing acidity with increasing shape irregularity. "Blotchy" and (more particularly) waxy fruits were lower than normal fruit in acidity, sugars and total solids. Fruit which ripened, but remained dark green near the calyx, gave supernormal values for sugars, acids and total solids, although excluded from the top grade. Values (particularly for acidity) were higher in the variety Immuna than in Potentate, and in both of them variations in composition of the fruit wall were reflected in that of the free juices. Changes in these values due to ripening are tabulated. A simple hand refractometer without temperature control gave very reliable determinations of total solids in tomato sap.

2595. JONES, J. P.
**The relation of certain environmental factors, tobacco mosaic virus strains, and sugar concentration to the blotchy ripening disease of tomato and the inheritance of the tendency to the disease.**
*Diss. Abstr.*, 1958, **19**: 650-1, being *L.C. Card No. Mic.* 58-3432 of 76 pp.

Considerable varietal differences in susceptibility and resistance to blotchy ripening were apparent. The variety Ponderosa is the probable source of resistance possessed by several pink-fruited varieties. The presence of tobacco mosaic in the plant may increase the incidence and severity of blotchy ripening, but the disease may also be severe on plants free from tobacco mosaic. The combination of shade, high N status and high soil moisture increased both the incidence and severity of blotchy ripening. Results of sugar analyses of fruit from succulent and non-succulent healthy plants and from succulent diseased plants were very variable. A sugar deficiency in the fruit of diseased plants was indicated by: (1) a greater concentration of total sugar in a healthy fruit of a diseased plant than in the ripe area of a blotchy-ripened fruit from the same plant; (2) a lower concentration of total sugar in the green blotched area of a blotchy-ripened fruit than in the ripe area of the same fruit; and (3) indirectly, by the greater concentration of total sugar in the fruit of non-succulent healthy plants than in the fruit of succulent healthy plants. These indications that blotchy ripening might be associated with a carbohydrate deficiency were offset by: (1) variations in fruit analyses; (2) experiments which showed no comparative differences between the concentrations of total sugar of fruit from succulent healthy and succulent diseased plants; and (3) analyses which showed no difference in total sugar in the leaves and stems of diseased and healthy succulent plants.—Ohio St. Univ.

2596. GOULD, W. A., GEISMAN, J. R., AND SLEESMAN, J. P.
**A study of some of the physical and chemical factors affecting the efficiency of washing tomatoes.**
*Res. Bull. Ohio agric. Exp. Stat.* **825**, 1959, pp. 20, illus.

The main object of washing was to remove *Drosophila* eggs. It is recommended that the fruit should first be soaked for 3 min. and vigorously agitated. The most effective water temperature is 130° F.; a 0·25% concentration of detergent may be needed plus a sodium hypochlorite solution giving 6–8 p.p.m. residual chlorine to control thermophilic organisms. The soak is followed by washing, the fruit revolving twice under sprays producing 130 p.s.i. pressure and covering 1 sq. ft. from a height of 7 in. above the conveyor. There should be 1 nozzle per sq. ft. of surface. Fresh water should be used for both soaking and spraying to avoid recontamination.

2597. ENGER, M. R., AND OTHERS.
**Efficiency and potential economies of dual-purpose shipping containers for machine-green tomatoes.**
*Mktg Res. Rep. U.S. Dep. Agric.* **257**, 1958, pp. 69, bibl. 7, illus., 40 cents.
BREAKIRON, P. L.
**Dual-purpose shipping containers for tomatoes.**
*Agric. Mktg*, 1958, **3** (12): 6, illus.

A study of containers used for shipping tomatoes in California and Florida showed that the use of dual-purpose containers can bring substantial savings in the cost of packing, transporting and repacking ripe fruit. The containers used to carry the mature green fruit from the producing areas to the repacking plants are used again as master containers to carry small tubes or trays of ripened fruit from the repacking plant to wholesale and retail stores.

he whole process is here considered in detail, with n account of difficulties still to be overcome. urrent opinion greatly favours the new fibre oard containers of different sizes instead of the ld-fashioned wooden lugs.

he second paper gives a short summary of the ame investigation.

598. SENGUPTA, G. C., AND PANDA, N.
**Insecticidal control of *Epilachna vigintioctopunctata* (F).**
*J. econ. Ent.*, 1958, **51**: 749.
f 4 treatments tried against *E. vigintioctopunctata* n eggplants endrin 20% e.c. at 1·5 lb./acre was he most effective, followed by malathion 25% w.p. t 2·5 lb./acre.—St. agric. Exp. Stat., Bhubanes-var, India.

### *Noted.*

599.

a ANDERSON, C. W.
**A study of field sources and spread of five viruses of peppers in central Florida.**
*Phytopathology*, 1959, **49**: 97-101, bibl. 14.

b AUDUS, L. J., AND GUNNING, B. E. S.
**Growth substances in the roots of *Pisum sativum*.**
*Physiol. Plant.*, 1958, **11**: 685-97, bibl. 29.
Four auxins and 2 inhibitors were found.

c AVIZOHAR-HERSHENZON, Z., AND PALTI, J.
**Small scale soil fumigation trials for the control of *Sclerotium rolfsii*.**
*Ktavim*, 1958, **9**: 147-51, bibl. 3, illus.
Satisfactory results with the chlorobromopropene product CBP55.

d BACCU, Y.
Quelques aspects économiques de la culture des tomates en Belgique. (**Some economic aspects of tomato growing in Belgium.**)
*Rev. Agric. Brux.*, 1958, **11**: 1209-33.
Production, distribution, consumption, standardization, foreign trade, future prospects.

e BOARD, P. W.
**Tomatoes for processing.**
*Food Pres. Quart.*, 1958, **18**: 73-5, bibl. 2.
Summarized information on harvesting and varieties from a questionnaire to Australian canneries.

f CALDWELL, J.
**Persistence of tomato aucuba mosaic virus in dried leaf tissue.**
*Nature*, 1959, **183**: 1142.
Dried leaves, stored for 24 years, still retained a little residual activity.

g CAREW, J., BARRY, D., AND CARPENTER, W. S.
**Rhubarb forcing: a production and marketing analysis of three major North American areas.**
*Quart. Bull. Mich. agric. Exp. Stat.*, 1958, **41**: 444-57, bibl. 12, illus.
Practices in Michigan, Washington and Ontario are described.

h DAVIES, J. N.
**Chromatographic studies of the free sugars of tomato fruit.**
*A.R. Glasshouse Crops Res. Inst. 1957*, 1959, pp. 67-8, bibl. 6.
Glucose and fructose contents given for 10 varieties; sucrose virtually absent.

i DIENER, T. O., AND WEAVER, M. L.
**Reversible and irreversible inhibition of necrotic ringspot virus in cucumbers by pancreatic ribonuclease.**
*Virology*, 1959, **7**: 419-27, bibl. 7.
Effects on host susceptibility and on the nucleic acid of the virus.

j GÄUMANN, E.
**The mechanisms of fusaric acid injury.**
*Phytopathology*, 1958, **48**: 670-86, bibl. 63.
Physiological effects of the toxin from *Fusarium* spp., mainly *F. lycopersici*, with special reference to tomatoes.

k GIRARDET, G.
Tomates en culture de pleine terre. Essais 1958. (**Tomatoes grown in the open. 1958 tests.**)
*Rev. hort. suisse*, 1959, **32**: 88-9.
Variety trials in Switzerland.

l GOIDÀNICH,, G.
Micologia pratica. (**Practical mycology.**)
Reprinted from *Progresso agric.*, 1958, Vol. **4**, No. 10, pp. 6.
Beautiful illustrations of a few edible and not so edible fungi.

m HENKEL, A.
Geeignete Sorten und Standweiten im Feldgemüsebau. (**Suitable varieties and spacings for vegetables grown in the field.**)
*Mitschurin Bew.*, 1958, **7**: 348-52, illus.
Includes data on the duration of the growing period for individual vegetable varieties.

n HÖJBY, H. R.
**New varieties being improved even further.**
*Fmg S. Afr.*, 1959, **34** (12): 31.
High-yielding and *Fusarium*-wilt-resistant tomato varieties Nelmark (for fresh market) and Nelcan (for canning).

o HONMA, S., PETERSON, C. E., AND WITTWER, S. H.
**Spartan 162—a slow bolting green pascal celery.**
*Quart. Bull. Mich. agric. Exp. Stat.*, 1958, **41**: 378-80, illus.

p HUSSEY, N. W., AND WYATT, I. J.
**Mushroom insects. Eelworm parasitic on *Megaselia halterata.***
*A.R. Glasshouse Crops Res. Inst. 1957*, 1959, pp. 140-1.
A nematode (*Bradynema* sp.) shows promise for control.

q HUYSKES, J. A.
Praktijkproeven met herfst- en winterprei, 1955 en 1956. (**Field trials with autumn and winter leeks, 1955 and 1956.**) [English summary ½ p.]
*Meded. Dir. Tuinb.*, 1959, **22**: 44-9, illus.
Non-winter-hardy varieties for autumn harvesting, and winter-hardy for post-winter harvesting.

r JAFFÉ, W. G., AND GAEDE, K.
**Purification of a toxic phytohaemagglutinin from black beans (*Phaseolus vulgaris*).**
*Nature*, 1959, **183**: 1329-30, bibl. 7.
A toxic protein, inactivated by boiling for 30 min.

s KAL'TJA, A. JA.
**The effect of granulated superphosphate on chlorophyll accumulation in the leaves, and on the yield of onions.** [Ukrainian, with English and Russian summaries.]
*Dopovidi AN URSR*, 1957, No. 1, pp. 78-80, from *Ref. Ž.* (*Biol.*), 1958, No. 6, Abstr. 25,058.
Greener leaves and higher yields from granules than from powder.

t KELSHEIMER, E. G.
**Yields of shallots affected by soil pesticide treatments.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 54-5, bibl. 2, illus.
Vapam outstanding [see also *H.A.*, 29: 401].

u KENDRICK, J. B., Jr., AND MIDDLETON, J. T.
**Influence of soil temperature and of strains of the pathogen on severity of *Verticillium* wilt of pepper.**
*Phytopathology*, 1959, **49**: 23-8, bibl. 12, illus.

v KÜBLER, W.
Werden Säuglinge durch den Nitratgehalt mineralisch gedüngter Gemüse gefährdet? (**Does the nitrate content of mineral-fertilized vegetables constitute a danger to babies?**) [English summary ½ p.]
*Qual. Plant. Maveg.*, 1959, **5**: 297-306, bibl. 25.
Spinach of high nitrate content not harmful when fed to babies daily for 1 week.

w LAWSON, J. A., AND REES, R. A.
**Vegetable growing at Carnarvon. A summary of vegetable trials at the Gascoyne Research Station 1957.**
*J. Agric. W. Aust.*, 1958, **7**: 603-7, illus.
Onions and rhubarb promising, celery poor, gladioli a possible sideline.

x LINN, M. B.
**Vegetable diseases.**
*Circ. Ill. agric. Ext. Serv.* **802**, 1958, pp. 65, illus.
Symptoms, general control methods, spraying and dusting equipment.

y LODEWIJKS, N. C.
**Early sex determination in asparagus.**
*S. Afr. J. agric. Sci.*, 1958, **1**: 335.
See *H.A.*, 29: 404.

z MODDES, R. E. J., AND COOK, J. W.
**The extraction and identification of parathion and Diazinon from lettuce.**
*J. Ass. off. agric. Chem. Wash.*, 1959, **42**: 208-11, bibl. 8.

2600.

a MOJA, A.
La produzione del seme di carota (*Daucus carota* L.). (**Carrot seed production.**)
*Sementi elette*, 1958, **4** (6): 50-7, bibl. 7, illus.
Methods used in Italy.

b N.I.A.B.
**Varieties of swedes.**
*Fmrs' Leafl. N.I.A.B.* **7**, 1958, pp. 4.

c NICKESON, R. L., AND CURRENCE, T. M.
**Selecting for combining ability in a male-sterile tomato line having two recessive seedling genes.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 377-84, bibl. 4.
Over several generations.

d NIENHAUS, F.
Rhabarberfäule durch *Phytophthora cactorum* (Leb. et Cohn) Schroet. (**A rhubarb disease caused by *Phytophthora cactorum.***)
*NachrBl. dtsch. PflSchDienst., Braunschweig*, 1959, **11**: 58-9, bibl. 5, illus.
Cultural control methods.

e PALTI, J.
**Oidiopsis diseases of vegetable and legume crops in Israel.**
*Plant Dis. Reptr*, 1959, **43**: 221-6, bibl. 16, illus.
On tomato, eggplant, chilli, carrot, onion and fenugreek; control by sulphur.

f PRISTUPA, N. A.
**The transportable form of carbohydrates in pumpkin plants.** [Russian, with English summary ½ p.]
*Fiziol. Rast.*, 1959, **6**: 30-5, bibl. 14, illus.
The main transportable carbohydrates were the oligosaccharides stachyose and verbascose.

g RANIERE, L. C., AND CROSSAN, D. F.
**The influence of overhead irrigation and micro-climate on *Colletotrichum phomoides*.**
*Phytopathology*, 1959, **49**: 72-4, bibl. 12, illus.
See *H.A.*, 29: 539.

h SARASOLA, A. A., AND DE SARASOLA, M. A.
Neuvas enfermedades del perejil y sandía en Argentina. (**New diseases of parsley and watermelons in Argentina.**) [English summary ⅓ p.]
*Rev. Fac. Agron. La Plata*, 1957, **33**: 161-5, bibl. 12, illus.
*Stemphylium radicinum* on parsley and *Fusarium moniliforme* on watermelons, with suggestions for control.

i SCHROEDER, W. T., AND BARTON, D. W.
**The nature and inheritance of resistance to the pea enation mosaic virus in garden pea, *Pisum sativum*.**
*Phytopathology*, 1958, **48**: 628-32, bibl. 8, illus.

j SIMONS, J. N.
**Virus diseases affecting vegetables in south Florida.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 31-4, bibl. 15.
Symptoms, weed hosts, transmission and control measures.

k TREE, E. F.
**Growing egg fruit at Bowen.**
*Qd agric. J.*, 1958, **84**: 679-81, illus.
Varieties and culture in Queensland.

l WIERING, D.
**Artificial pollination of cabbage plants.** [Dutch summary 6 lines.]
*Euphytica*, 1958, **7**: 223-7, bibl. 3, illus.
With the aid of a specially modified pair of scissors.

m WILSON, J. Y.
**A third species of "pepper" in West Africa.**
*Nature*, 1959, **183**: 1142, bibl. 2.
Two varieties of *Capsicum sinense* [see *H.A.*, 28: 1535] discovered.

n YOUNG, P. A.
**Tomato for warm areas.**
*Amer. Veg. Gr*, 1959, **7** (1): 22.
Hotset tomato will set fruit at 70°–93° F. day temperature and at 59°–74° F. night temperature.

o ZACHARIUS, R. M., MORRIS, C. J., AND THOMPSON, J. F.
**The isolation and characterization of $\gamma$-L-glutamyl-*S*-methyl-L-cysteine from kidney beans (*Phaseolus vulgaris*).**
*Arch. Biochem. Biophys.*, 1959, **80**: 199-209, bibl. 28.
It accounts for about 34% of the non-protein amino N in mature bean seeds.

## TOBACCO.

### *General.*

(*See also* 2651o, p, 3089, 3112.)

601. CASTLE, P. S.
**Tobacco in Ghana.**
*Ghana Fmr*, 1959, **3** (1): 23-6, 28.

*. rustica* is widely grown for local use, but the lanting of *N. tabacum* for marketing is increasing. he present industry is based largely on Harrison pecial and Virginia Hybrid, but several varieties uitable for the black fat type of pipe tobacco ppear to grow well. The chief pests are cut worms, rmy worms, crickets, and stem borers. Gammexne has been used successfully in seed beds, but its se has not yet spread to the fields. Production gures are given by districts. H.L.

2602. BHAT, N. R.
**Progress of research under the Indian Central Tobacco Committee.**
*Indian Tobacco*, 1958, **8**: 205-16, illus.

One of the conclusions reached from the programme of experimental work has been that soaking seed in water until it begins to germinate is an effective pre-treatment in preventing poor stands in the nursery during hot weather. Deep cultivation and deep fertilizer placement are now recommended for flue-cured Virginia, and an implement for doing this has been devised. Of the new varieties Delcrest has proved its superiority to Chatham and Harrison Special for cigarettes, and Dixie Shade has proved the best wrapper variety. Provisional results from extensive fertilizer, cultural and variety trials are summarized. [For earlier work see *H.A.*, 28: 1557.] H.L.

2603. SIM, J. T. R.
**Agronomy investigations in the winter rainfall region, 1892-1953.**
*Sci. Bull. S. Afr. Dep. Agric.* **373,** 1958, pp. 150.

Among the aspects covered are work on tobacco and vegetables. *Tobacco.* Turkish tobacco growing started in 1903. Today Soulouk and Elsenburg Turk are the standard varieties. Turkish tobacco has also been submitted to fertilizer and green manuring experiments, to seed bed studies and to spacing, irrigation and drying trials. *Vegetables.* The past nine years in the winter rainfall area have been devoted mainly to isolating the best strains of the following vegetables: potatoes, tomatoes, green beans, sugar or dry beans, carrots, beetroot, cabbages, cauliflowers, peas, onions, sweet potatoes, pumpkins, squashes, cucumbers, musk melons, watermelons, lettuces, radishes and turnips. The results of the work on the production of improved or now accepted strains are briefly noted, and varieties available are listed.

2604. FINKNER, A. L., AND RIGNEY, J. A.
**A study of the accuracy of ASC measurements of tobacco acreage.**
*Tech. Bull. N.C. agric. Exp. Stat.* **135,** 1958, pp. 19.
FINKNER, A. L.
**How accurate are tobacco measurements?**
*Res. and Fmg N.C.*, 1958, **16** (3): 6-7.

Measurements of tobacco fields by ASC (Agricultural Stabilization and Conservation) surveys should, by regulation, be within $\frac{1}{100}$th of an acre. A check survey of 86 fields by civil engineers has shown that errors average about $\frac{1}{10}$th of an acre. The nature and causes of this inaccuracy are discussed. Doubling the scale of the aerial photographs used and assessing acreages by planimeter instead of rotometer would increase accuracy, but not to the extent required.

### *Breeding and varieties.*

(*See also* 2651b, c, e, g-i, w.)

2605. PEENS, J. F.
Natuurlike kruisbestuiwing by tabak (*Nicotiana tabacum*). **(Natural cross-pollination of tobacco.)** [English and French summaries 7 lines each.]
*S. Afr. J. agric. Sci.*, 1958, **1**: 237-44, bibl. 4.

The percentage of natural cross-pollination between tobacco plants is very low, and seldom exceeds 0·5% when the parents are 4 ft. apart. The percentage decreases with increasing isolation.—Cent. Tob. Res. Stat., Rustenburg.

2606. BHAT, N. R., RADHAKRISHNAMURTY, B., AND KRISHNAMURTY, I. V. G.
**A study of varietal responses in flue-cured tobacco.**
*Indian Tobacco*, 1958, **8**: 217-24, bibl. 1.

Yields and other varietal characteristics are tabulated for 6 of the 19 varieties tested between 1955 and 1958 at the Central Tobacco Research Institute. Using the percentage of bright leaf as the decisive factor, Delcrest heads the list, with Hicks second, their average yields of bright leaf being significantly greater than those from Chatham or Harrison Special. H.L.

2607. GEORGIEV, H. D.
**A case of new growth habit in tobacco.** [Bulgarian.]
*Izv. botan. In-t, Bălg. AN*, 1956, **5**: 477-8, from *Ref. Ž.* (*Biol.*), 1958, No. 2, Abstr. 6,259.

In the neighbourhood of Haskovo, Bulgaria, tobacco plants were found with a prolonged growing period, extremely vigorous growth (180 cm.) and 60–65 leaves instead of the 25 on the original variety. The strain is resistant to drought, diseases and thrips and has been named Haskovo 14. The cause of its appearance is unknown.

2608. WOLF, F. A.
**Cytoplasmic inheritance of albinism in tobacco.**
*Tobacco, N.Y.*, 1959, **148** (13): 26-30, bibl. 13, illus.

The type of albinism in tobacco under consideration in this study was found to be cytoplasmically inherited. This was shown by failure of pollen from albinistic plants to transmit the factors concerned in this abnormality to apparently normally green plants. In extreme cases albinistic tissues contain less than $\frac{1}{700}$th the amount of chlorophyll in normal tissues. Chloroplasts may be present in each leaf-blade tissue or may be absent from any of them. They were noted to occur in ordinary epidermal cells, an unusual phenomenon, and not in the guard cells only. [From author's summary.]

### *Seeds and seedlings.*

2609. ČIRKOVSKIJ, V. I.
**The frost resistance of tobacco and mahorka seeds.** [Russian.]
*Tabak*, 1958, **19** (4): 56-8.

Tobacco seed with a moisture content below 14% withstood freezing for 2 days at temperatures down to −23° C., and when the moisture content was below 11% it withstood similar temperatures for 6 days. The viability of treated seed over a 3½-year storage period was not lower than that of untreated seed, but older seed was more sensitive to frost treatment than fresh seed. It is considered that exposure of seeds to temperatures between −20° to

25° C. is dangerous. Mahorka seed was found be considerably more frost resistant than bacco seed.

610. Manolov, A. I.
**Breaking dormancy of tobacco seeds.** [Bulgarian.]
*Izv. Inst. Biol. Met. Popov, BAN*, 1957, **8**: 83-98, bibl. 14, from *Abstract Card Inst. Tabakforsch., Dresden*, No. 59/60.

he rate of germination of tobacco seed was arkedly increased following soaking for 12 hours a 0·5% phosphoric acid solution. The effects of tobacco extract, formalin and boric acid were naller.

611. Popov, M.
**Trials on stimulating tobacco seeds and seedlings.** [Bulgarian, with English and Russian summaries.]
*Izv. In-ta Biol. Bălg. AN*, 1956, **7**: 53-72, from *Ref. Ž. (Biol.)*, 1958, No. 2, Abstr. 6,260.

ulgarian work over the period 1925–1955 is viewed. Very good results were obtained by eating tobacco seeds for 3 hrs with a mixture of % KBr and 2% takadiastase (a ferment preparaon obtained from *Aspergillus oryzae*). Seed eatment for 8–10 hrs with 2% KBr was also tisfactory. Watering the seedlings during the rmation of the first pair of leaves with 0·25– 50% KBr at 4 l./sq. m. was even more effective an seed treatment.

612. Weidemann, C.
Der Einfluss der Setzlingsqualität auf den Ertrag. **(The effect of seedling quality on tobacco yield.)** [Russian and English summaries 10–12 lines.]
*Ber. Inst. Tabakforsch. Dresden*, 1958, **5**: 351-62, bibl. 4, illus.

bservations of growth and yield records over everal years suggest that tobacco seedlings which re pricked out prior to transplanting in the field roduce better plants than seedlings which are not ricked out. Deep setting encourages the formation f lateral roots by the young plant.

### *Rotations and nutrition.*

(*See also* 2651 l.)

613. Steffens, G. L., and Street, O. E.
**Effects of winter cover crops on growth, quality and nitrogen nutrition of Maryland tobacco.**
*Bull. Md agric. Exp. Stat.* **A-86**, 1957, pp. 40, from abstr. in *Tob. Abstr.*, 1958, **2**: 217.

ver a 5-year period tobacco following vetch ielded the highest and that following non-legumes he lowest. Determinations were made of the N upplied to the soil by the various cover crops tested. When growth and quality were considered, the best results came from using winter cover crops containing a mixture of legumes and non-legumes.

2614. Schmid, K.
Über die Nährstoffwirkung einiger Humusdüngemittel im Tabakbau. **(The nutrient effect of some organic manures in tobacco culture.)**
*Dtsch. Tabakb.*, 1958, **38**: 45-9, from *Abstract Card Inst. Tabakforsch., Dresden*, No. 59/36.

On a thin acid soil yields of Havana IIc, Geudertheimer III and Virgin L were higher with 50 dz./ha. of tobacco leaf waste (ribs) than with 200 dz./ha. of farmyard manure, but were lower than with 40 kg. N (applied as ammonium sulphate plus nitrate) with P and K.

2615. Tombesi, L.
Nutrizione minerale e attività enzimatiche delle piante. Compendio di ricerche eseguite particolarmente su *Nicotiana tabacum* cv. Virginia Bright. **(Mineral nutrition and enzyme activity of plants. Summary of research carried out particularly on *Nicotiana tabacum* var. Virginia Bright.)** [English summary $\frac{3}{4}$ p.]
*Ann. Sper. agrar.*, 1958, **12**: 1515-27, bibl. 19.

Recently published work on the effects of deficiency and excess of N, P or K and of drought on enzyme activities, which determine the quality of tobacco, is reviewed in some detail.

2616. Peterson, L. A.
**Correlation of nitrogen soil tests with nitrogen uptake by the tobacco plant.**
*Diss. Abstr.*, 1959, **19**: 1492, being *L.C. Card No. Mic.* 58-7525 of 85 pp.

Highly significant correlations were found between N uptake by tobacco and the following N properties of soil: initial nitrate N content, ammonia N extracted by *N* sulphuric acid, ammonia N extracted by 4 *N* hydrochloric acid, total soil N, alkaline permanganate N and percentage organic matter. The coefficients for exchangeable ammonia and nitrification rates were not significant. The initial nitrate N content accounted for 94% of the variation in N uptake. In tests with 37 soil types N uptake by tobacco was correlated with the amounts of N released by the various soil N tests. The initial nitrate N content gave the best correlation. Total soil N was highly significantly correlated with percentage soil organic matter, alkaline permanganate N and nitrification rates. In field studies the nitrate N content of soil samples, taken in both early spring and mid-season, was significantly correlated with N uptake by the tobacco crop. In general, the nitrate N content of the soil accounted for about 25% of the variation in N uptake by the tobacco crop.—Univ. Wis.

2617. Bausá Alcalde, M.
Acerca de la influencia del nitrógeno amónico sobre el desarrollo de las raíces aisladas de *N. tabaccum.* **(The effect of ammonium nitrogen on the development of excised roots of *Nicotiana tabacum.*)**
*Farmacognosia*, 1958, **18**: 201-6, bibl. 8.

Root cultures of tobacco showed better development when the nitrate N of the standard culture solution was reduced by 99% than when the N supply consisted entirely of ammonium salts or of these salts plus a reduced quantity of nitrate. The presence of ammonium salts made the roots yellow and unhealthy, and inhibited the utilization of N from yeast extract.

2618. Lovett, W. J.
**Studies on the metabolism of detached tobacco leaves. I. The influence of potassium nutrition on the growth of tobacco and the quality of cured leaf.**
*Aust. J. agric. Res.*, 1959, **10**: 27-40, bibl. 27, illus.

Tobacco plants were grown from seed in sand culture and transplanted after 56 days into large earthenware pots of sand. Nutrients were supplied to provide 2 levels of N with 3 levels of K. Harvesting of leaves began 60 days after transplanting. An account is given of the curing procedure carried out in controlled-temperature cabinets. A correlation was noted between K nutrition and quality. Poor quality leaf from low K levels showed symptoms resembling "trashy leaf" found in commercial practice. Potassium levels in the culture medium and in the plant affected leaf area and leaf weight per unit area and also loss of fresh weight and colour changes during curing.—Waite agric. Res. Inst. M.C.S.

2619. Lityński, T., Jurkowska, H., and Gorlach, E.
Wartość termofosfatu magnezowego jako nawozu fosforowego przy uprawie tytoniu. **(Value of magnesium thermophosphate as phosphorus fertilizer in tobacco cultivation.)**
*Rolnictwo*, 1956, No. 1, pp. 119-32, from abstr. in *Tob. Abstr.*, 1958, **2**: 320.

Compared with superphosphate and slag, magnesium thermophosphate improved quality, increased the number of prime and good quality leaves, slightly reduced the nicotine content, but did not increase yields.

2620. Yoshida, D.
**Magnesium nutrition of the tobacco plant at each growing stage. I. Relation between development of magnesium deficiency and composition of tobacco plants. II. Fractional distribution of magnesium and calcium in tobacco leaves.**
*J. Sci. Soil Manure*, 1957, **27**: 511-14 an **28**: 48-50, from abstracts in *Tob. Abst* 1958, **2**: 322 and 367.

In Mg-deficient plants Mg was lowest in the lowe leaves and decreased as the plants grew. In non deficient plants it was highest in the upper leave and increased with growth. K was higher in M deficient plants than in non-deficient plants an increased with growth. P and Ca were not i creased by supplying Mg. Protein N did not diffe in content as between the leaves of deficient an non-deficient plants, and it decreased with plan growth, but non-protein N was higher in th deficient plants and increased with growth. In th case of Mg deficiency, such non-protein N amide N, free $NH_4^+N$, alpha-$NH_2N$ and nitrate increased, but nicotine N decreased. Solubl sugars and starch decreased with the developme of Mg deficiency.

The second paper describes successive extractio of Mg and Ca with alcohol, acetic acid and HC both being extracted in the acetic acid fraction.

2621. Fromageot, P., and Perez-Milan, H.
Réduction du sulfate en sulfite par la feuil de tabac. **(Reduction of sulphate to sulphit by the tobacco leaf.)**
*Biochim. biophys. Acta*, 1959, **32**: 457-6 bibl. 14.

It is shown that whole tobacco leaf reduces ($^{35}$ sulphate to ($^{35}$S) sulphite. The amount and th specific radioactivity of the labelled sulphit recovered indicate that daylight plays an essenti part in this process, which is a rapid one. I quantitative analysis is, however, rendered difficu by oxidation of sulphite to sulphate. [Fro English summary.]—Cent. Ét. nucl. Saclay, Gi sur-Yvette, S. et O.

### *Physiology and biochemistry.*

(*See also* 2046, 2651d, f, m, n, r-v, x, z, 2652a, d.)

2622. Amarell, H.
Der Einfluss von Düngung, Boden un Sorte auf die relative Transpiration junge Tabakpflanzen. **(The effects of manurin soil and variety on the "relative transpira tion" of young tobacco plants.)** [Russia and English summaries 1 p. each.]
*Ber. Inst. Tabakforsch. Dresden*, 1958, 5 217-319, bibl. 84, illus.

After an initial attempt to measure the transpiratio of tobacco plants in the field had failed to yiel reliable results, seedlings were used in the labora tory, the methods employed being described. I general, transpiration was reduced by $P_2O_5$ an stimulated by $K_2SO_4$; protein formation wa reduced by increasing supplies of $K_2SO_4$ bu favoured by KCl. Multiples of NPK produced rise in transpiration. Typical differences in trans

ration were also recorded between the various
ils used and between the various varieties tested.

23. Chouteau, J.
Interaction des mouvements stomatiques et du comportement hydrique du tabac. (**Interaction between stomatal movements and water balance in tobacco.**) [English summary ½ p.]
*Ann. Inst. exp. Tabac Bergerac*, 1958, **3** (1): 31-65, bibl. 24, illus.

was found that stomatal movement becomes
bject to regulatory mechanism as soon as any
the available water has been lost, but that
osure becomes of importance only when the soil
s lost over 50% of its available water; transpira-
on is then reduced, the reduction reaching 90%
hen the stomata close completely. When the
lting point is reached, the water deficit may reach
% through cuticular transpiration. The lower
aves, before they mature, contain relatively more
oisture than the upper leaves which may suffer
nsiderable water deficits. Stomatal photo-
nsitivity decreases as the leaves age.

24. Sisler, E. C., and Evans, H. J.
**Electron transport mechanisms in tobacco roots. I. Studies on the cytochrome and related systems.**
*Plant Physiol.*, 1959, **34**: 81-90, bibl. 32.

study has been conducted to determine the
operties and the relative significance of the
ochrome system in the roots of tobacco plants.
use of a direct spectroscopic method with
rticulates and spectrophotometric studies with
itonin extracts of root particulates, absorption
nds have been demonstrated that are charac-
ristic of cytochrome oxidase and cytochromes b or
r perhaps both. An evaluation of the cytochrome
oxidative capacity of extracts has provided
idence that roots contain sufficient activity of
is enzyme to account for the respiratory oxygen
ptake by intact roots. The Michaelis constant for
e cytochrome oxidase-oxygen-complex using
gitonin extracts of roots has been estimated to
e $4 \cdot 5 \times 10^{-6}$ M. The comparable $K_M$ for particu-
tes without digitonin was estimated to be $5 \times 10^{-6}$
These values are approximately one third that
stimated for the phenol-oxidase-oxygen complex
tobacco root extracts. Succinic-cytochrome c
eductase activity which was inhibited by Anti-
ycin A and SN 5949 (2-hydroxy-3-(2-methyl-
ctyl)-1,4-naphthoquinone) was demonstrated in
articles, and it was shown that the cytochrome c
eductase capacity of this enzyme was sufficient to
ccount for the respiratory oxygen uptake of roots.
obacco root extracts failed to oxidize DPNH
diphosphopyridine nucleotide] at an appreciable
ate unless some electron acceptor such as cyto-
hrome c menadione or chlorogenic acid was added
reaction mixtures. [Authors' summary.]—
.C. St. Coll., Raleigh.

2625. Burk, L. G., and Jeffrey, R. N.
**A study of the inheritance of alkaloid quality in tobacco.**
*Tobacco, N.Y.*, 1958, **147** (25): 20-2, bibl. 7.

The Maryland medium broadleaf variety Robinson, which is known to convert nicotine to nornicotine, was crossed with 3 non-conversion varieties. Parent plants and hybrids to the $F_3$ generation were tested for alkaloid quality and placed in 5 classes. It was evident that the conversion of nicotine to nornicotine was controlled by a major gene, and the distribution of individuals within the alkaloid classes suggested the influence of modifiers. There was no evidence of maternal or paternal inheritance. —U.S.D.A., Beltsville, Md.

2626. Bausá Alcalde, M.
Algunos datos sobre formación de alcaloides en el género *Nicotiana*. (**Some data on the formation of alkaloids in the genus *Nicotiana*.**)
*Farmacognosia*, 1958, **18**: 187-99, bibl. 5, illus.

Seedlings of *Nicotiana tabacum*, *N. glauca* and *N. sylvestris* were grown in hydroponic tanks supplied with a nutrient solution including trace elements, and in closed flasks with a nutrient solution to which yeast extract had been added. Half the *N. tabacum* plants were grown in light and half in darkness. After 2–3 months the roots, shoots and solutions were analysed for percentage alkaloid content, which in all 3 species was higher in the roots than in the plants as a whole. Root alkaloids were higher in tank-grown than in flask-grown plants, but for total plant alkaloids this was reversed. Under normal conditions the escape of alkaloids into the nutrient solution was negligible, but in closed flasks, in darkness, or with excised roots (as in a previous experiment [see *H.A.*, 27: 2593]) it was considerable, but alkaloid production in roots was also higher in darkness than in light.

2627. Wada, E., Kisaki, T., and Ihida, M.
**The tobacco alkaloids in the root and sap of some *Nicotiana* plants.**
*Arch. Biochem. Biophys.*, 1959, **80**: 258-67, bibl. 9.

Anatabine has been isolated from the root of *Nicotiana tabacum*, Bright Yellow variety, and the cured leaf of Cherry Red tobacco. A paper chromatographic study indicated that the roots of two varieties of *N. tabacum*, Bright Yellow and Burley, and *N. glutinosa* have at least eight pyridine alkaloids including nicotine, nornicotine, anabasine and anatabine. In contrast, the stem and the leaf of the three plants contain only nicotine and a very small amount of nornicotine, with the exception that *N. glutinosa* contains a higher nornicotine content in both stem and leaf. The sap of Bright

Yellow variety has almost the same alkaloid distribution pattern as that of the root, including anatabine. [Authors' summary.]—Cent. Res. Inst., Japan Monopoly Corp., Tokyo.

2628. Il'in, G. S., and Lovkova, M. Ja.
**The biogenesis of nicotine and the conversion of nitrogen compounds in tobacco shoots.** [Russian, with English summary 11 lines.]
*Biohimija*, 1959, **24**: 274-9, bibl. 28, illus.

The N metabolism of germinating tobacco seed was studied to ascertain the beginning of nicotine formation. Qualitatively no change occurred in the amino acid composition of the proteins, but quantitatively the alanine, valine, phenylalanine and leucine contents increased irregularly and arginine decreased. The glutamic acid of all fractions showed a regular decline. The free amino acid content, except glutamic acid, rose uniformly, reaching a maximum on the 5th day after germination. While the glutamic acid content decreased, the nicotine content increased, indicating that this acid may be a possible precursor of nicotine.

2629. Il'in, G. S.
**Studies on tobacco alkaloids.** [Russian, with English summary 6 lines.]
*Izv. Akad. Nauk S.S.S.R., Ser. biol.*, 1959, No. 2, pp. 206-14, bibl. 12.

Tobacco alkaloids are formed in the course of plant ontogenesis in close connexion with nitrogen metabolism. Specific peculiarities of their appearance and transformation in plants have been established. Splitting of the methyl group of nicotine has been demonstrated, and it is suggested that these are used in the reactions of biological methylation. Fixation of $CO_2$ has been recorded—this is taken up via the roots and used in alkaloid synthesis. The special rôle of the root in synthetic processes has been demonstrated. [Author's English summary. See also *H.A.*, 29: 604.]

2630. Lamberts, B. L., Dewey, L. J., and Byerrum, R. U.
**Ornithine as a precursor for the pyrrolidine ring of nicotine.**
*Biochim. biophys. Acta*, 1959, **33**: 22-6, bibl. 16.

Radioactive nicotine, from *Nicotiana rustica* plants which had been fed (2-$^{14}$C)-ornithine, was degraded with recovery of C-5 of the pyrrolidine ring. This position of the ring was shown to have about half of the radioactivity of the original nicotine. The remaining radioactivity was in the residual carbon skeleton of the nicotine, which was isolated as a derivative of a substituted primary amine. A previous degradation had established that the radioactivity in the amine derivative was in the carbon atom corresponding to position 2 of the pyrrolidine ring of nicotine. This pattern of labeling supports the postulation of one or more symmetrical intermediates in the synthesis of the pyrrolidine ring of nicotine from the amino acid ornithine. [Authors' summary.]—Mich. St. Univ., E. Lansing.

2631. Henderson, L. M., and others.
**Lack of a tryptophan-niacin relationship in corn and tobacco.**
*J. biol. Chem.*, 1959, **234**: 93-5, bibl. 26.

Plants of *Nicotiana rustica* which absorbed $C^{14}$-labelled tryptophan failed to yield any radioactive nicotine. Similarly, in experiments on maize plants, trytophan and 3-hydroxyanthranilic acid were not incorporated in the vitamin niacin. These findings run counter to much non-isotopic evidence, which suggested that tryptophan acted as a niacin precursor.—Univ. Ill. Urbana, and Mich. St. Univ., E. Lansing.

2632. Tso, T. C., and Jeffrey, R. N.
**Biochemical studies on tobacco alkaloids. I. The fate of labeled tobacco alkaloids supplied to *Nicotiana* plants.**
*Arch. Biochem. Biophys.*, 1959, **80**: 46-56, bibl. 9.

The $N^{15}$-labeled alkaloids, nicotine, nornicotine and anabasine, were each supplied through the roots of *Nicotiana rustica* var. *brasilia* plants in water culture. $N^{15}$ and $C^{14}H_3$ double-labeled nicotine was supplied similarly to *Nicotiana glauca* to study the fate of these alkaloids in *Nicotiana* plants. A majority of the labeled alkaloid supplied was metabolized and the label appeared in other compounds. The major alkaloid found was characteristic of the experimental plant and was equally labeled with $N^{15}$ in both rings, like the alkaloid supplied. Some of the $N^{15}$ alkaloids supplied probably were converted to new alkaloids by a route more direct than through the general metabolic pool. The $N^{15}$ to $C^{14}$ ratio of the anabasine in the *N. glauca* plant was half that of the $N^{15}$ methyl-$C^{14}$ labeled nicotine supplied. Thus the anabasine was not formed by mere rearrangement of the nicotine molecule. [Authors' summary.]—Univ. Md, College Park, and U.S.D.A., Beltsville.

2633. Parups, E. V.
**Influence of gibberellic acid on the nicotine content of cigar tobacco.**
*Canad. J. Plant Sci.*, 1959, **39**: 48-55, bibl. 11.

Treatment with GA resulted in a significant decrease in nicotine content in tobacco seedlings and in plants approaching maturity, without affecting the dry matter content of the leaves. It is suggested that the decrease in the nicotine content of leaves resulted from a change in root metabolism caused by GA treatment [see also *H.A.*, 29: 593].—Canada Dep. Agric., Ottawa.

34. Wada, E., Kisaki, T., and Saito, K.
**Autoxidation of nicotine.**
*Arch. Biochem. Biophys.*, 1959, 79: 124-30, bibl. 16.

cotinic acid, oxynicotine, nicotyrine, cotinine, d myosmine have been isolated and identified om the oxidation products of nicotine by aeration 37° C. The presence of methylamine and monia in the same oxidation products has also een established. These results indicate that non-zymic reactions may account, to some extent, for e transformation of nicotine during ageing and rmentation of tobacco leaves, together with zymic reactions. [From authors' summary.]—ntl. Res. Inst., Japan Monop. Corp., Tokyo.

35. Mamedov, M. K.
**Quantitative determination of tobacco flavonoids. [Russian.]**
*Tabak*, 1958, 19 (4): 56-8, bibl. 11.

description is given of a method based on the lorimetric measurement of the colour produced the flavonoids with aluminium chloride.

36. Murakami, T.
**Bioassay, properties and isolation studies of a growth factor in tobacco.**
*Diss. Abstr.*, 1959, 19: 1130, (order L. C. Card No. Mic. 58-7183) of 100 pp.

growth factor was extracted from greenhouse and ld-grown tobacco plants by precipitating the oteins from expressed juice, followed by clarification and concentration in vacuo. Growth of bacco tissue was promoted by the factor only hen auxin (IAA) and kinetin were present. The sponse of callus tissue to an extract was linear ith the concentration up to ≈150 mg./50 ml., hile that of pith tissue was linear up to ≈250 g./50 ml. Tissue 3-4 weeks old was more responsive to the extract. Several growth-promoting bstances were tested but were unable to duplicate e effect of the extract. In biochemical tests the tract showed highly polar and non-ionic properties, and it is suggested that it is a carbohydrate mpound.—(Univ. Wis.)

37. Clayton, R. A.
**Pentose cycle activity in cell-free extracts of tobacco leaves and seedlings.**
*Arch. Biochem. Biophys.*, 1959, 79: 111-23, bibl. 22.

he studies reported here in some detail form part a programme designed to throw light on the etabolic pathways operative in the growing leaf, the hope that this approach will lead to a better derstanding of the changes that occur during the ring and ageing processes. They show, among her things, that there is pentose cycle activity extracts of tobacco seedlings and young leaves t not in extracts of leaves at or beyond the mid-stalk position of mature plants.—Amer. Tob. Co., Richmond, Va.

2638. Izard, C.
**Recherches biochimiques sur la pigmentation de N. glauca Grah. [Biochemical studies on the pigmentation of *N. glauca*.] [English summary 4 lines.]**
*Ann. Inst. exp. Tabac Bergerac*, 1958, 3 (1): 67-76, bibl. 4, illus.

The stalk epidermis of *N. glauca* contained a delphinidol glycoside and various polyphenols. Chlorogenic acid and rutin were identified. A polyphenoloxidase was isolated which possessed high activity towards chlorogenic and caffeic acids. Scopoletin was also present.

2639. Nagasawa, M., and Taguchi, T.
**A microcolorimetric method for the determination of quinic acid and its content in flue-cured tobacco.**
*Sci. Pap. cent. Res. Inst., Jap. Monop. Corp.*, Tokyo, 1958, 99: 10-12. From *Abstract Card Inst. Tabakforsch. Dresden*, No. 59/171.

Quinic acid was determined by using the reaction of periodate-oxidation products of quinic acid on sodium nitroprusside and piperazine. In the range of 20-150 μg. of quinic acid in 1 ml. a linear curve resulted from the test. In flue-cured tobacco the quinic acid content accounted for 0·2% of the dry weight.

2640. Hellier, D. N.
**Estimation of the lipid fractions of tobacco.**
*Chem. Ind. Lond.*, 1959, No. 8, pp. 260-1, bibl. 3.

The determination of the petroleum ether-soluble fraction is one method of measuring tobacco leaf quality. A simple alternative chromatographic procedure has been devised for the determination of the total lipids in the ethanol extract and their subdivision into 3 groups, designated soft resins and hard resins A and B. Resin analyses are presented for samples of bright tobacco from America, Rhodesia and Italy and for Turkish dark leaf. A high soft resin content found in the American sample and a low total resin content found in the Rhodesian sample are considered to be typical of the tobaccos grown in these two regions.—Res. Dep., Carreras Ltd., London.

2641. Phillips, M., and Bacot, A. M.
**The chemical composition of representative grades of the 1951 and 1952 crops of burley tobacco, including chemical methods.**
*Tech. Bull. U.S. Dep. Agric.* 1186, 1958, pp. 54, bibl. 33, illus.

Some 25 different chemical determinations were made on each of three grades, covering nicotine, types of ash, various mineral elements, categories of nitrogenous compounds, the main organic groups, pH, and certain water and organic solvent extracts. The results are tabulated, and correlations, or the absence thereof, between these and leaf quality are discussed. Of the nitrogen fraction total N, ammonia N, and particularly α-amino N and volatile bases expressed as $NH_3$ showed negative correlations with grade, as did total alkaloids (as nicotine). Reducing sugars, as glucose, and tannins showed a small, gradual increase from the "flyings" (lowest leaves) to the "tips" (uppermost leaves) group, while polyphenols showed the reverse trend. The amounts present of plastid pigments, protopectin, pectic acid and pectates were indicative of maturity, as were also crude fibre, cellulose and lignin. Both the 95% ethanol and hot water extracts showed marked increases as the grade improved. Methods of sampling and analysis are described in detail.

H.L.

2642. PEARSE, H. L., AND MARKANTONATOS, A.
**South African tobaccos, III. Partial chemical composition of various tobacco types according to market value.** [Afrikaans and French summaries ½ p. each.]
*S. Afr. J. agric. Sci.*, 1958, **1**: 315-26, bibl. 8.

The more valuable flue-cured tobaccos contained lower contents of N, protein, nicotine and petroleum ether extracts, and higher contents of soluble sugar, than those of lower value. Light air-cured tobaccos showed similar trends, except that sugar contents were much lower, and petroleum ether extracts higher, in the better quality groups. Dark air-cured tobaccos had much higher contents of N and nicotine and very low sugar contents; superior quality was associated with high N, protein and nicotine. [For Part II see *H.A.*, 27: 3640.]—Cent. Tob. Res. Stat., Rustenburg.

2643. BENTLEY, H. R., AND BERRY, E. G. N.
**The constituents of tobacco smoke—an annotated bibliography.**
*Res. Pap. Tobacco Mfrs' Stand. Cttee* **3**, Bristol, 1959, pp. 49.

This careful work of annotation consists of notes followed on each occasion by references [translated titles, with citation of original journal in full] on the following: nicotine 267 refs, bases 68, acids 35, phenols 19, hydrocarbons 69, neutral fraction 56, arsenic 18, miscellaneous 75. Subject indexes add to the ease of consultation.

### *Desuckering.*

2644. HITIER, H., MOUNAT, A., AND RENIER, A.
Incidence de l'inhibition des bourgeons sur la production du tabac. (**The effect of sucker suppression on tobacco yield.**) [English summary ½ p.]
*Ann. Inst. exp. Tabac Bergerac*, 1958, **3** (1): 11-29, bibl. 3.

Compared with standard suckering methods, repeated hand suckering resulted in a 6–8% yield increase and in higher quality and nicotine level. The increase in crop value more than paid for the extra labour cost. Suppressing suckering by applying 0·5 c.c. of walnut oil to each of the top 2 suckers immediately after topping caused yield increases of 10 and 14%, depending on whether the plant was reaped whole or primed, a lower nicotine content and a tendency towards an increase in heavy element content.

### *Diseases and pests.*

(*See also* 2651e, k, q, y, 2652b.)

2645. HITIER, H., AND IZARD, C.
Essais de lutte contre la mosaique du tabac par la chimiothérapie et par l'hybridation et la sélection génétique. (**Experiments on the control of tobacco mosaic by chemotherapy and by hybridization and selection.**) [English summary ⅓ p.]
*Ann. Inst. exp. Tabac Bergarac*, 1958, **3** (1): 85-96, bibl. 17.

Numerous chemotherapeutic substances were tested with negative results. Certain hybrids proved to be resistant to mosaic, but they were of low economic worth. The authors conclude that the genetical approach has only limited possibilities in view of the multiplicity of tobacco viruses and recommend concentrating on crop sanitation measures.

2646. HARE, W. W., AND LUCAS, G. B.
**Control of contact transmission of tobacco mosaic virus with milk.**
*Plant Dis. Reptr*, 1959, **43**: 152-4, bibl. 5, illus.

Control of TMV was obtained on greenhouse plants of pepper, tomato and tobacco, and on tobacco in the field by spraying transplants with homogenized, canned or dried skim milk during the 24 hours before virus inoculation.—Miss. St. Coll., and N.C. St. Coll., Raleigh.

2647. MICHEL, É.
Essais de produits de synthèse contre les pucerons (*Myzus persicae*) s'attaquant aux tabacs cultivés sous toile. (**Trials of synthetic products against aphids (*M. persicae*) attacking shade grown tobacco.**) [English summary ⅓ p.]
*Ann. Inst. exp. Tabac Bergerac*, 1958, **3** (1): 97-113.

The systemic insecticide methyl demeton, at 100 c.c. of a 0·05% active ingredient solution applied to the soil around the plant, destroyed 90% of the aphids within 24 hrs and 100% by the third day. The residual effect lasted 15 days. As contact insecticides, Chlorthion and methy parathion gave 91% and 82% control after 24 hours.

### *Curing and fermentation.*

648. PAL, N. L.
**A note on the flue-curing of tobacco by oil curers.**
*Indian Tobacco*, 1958, **8**: 237-44, illus.

lthough the use of oil burners reduces labour costs nd the curing time and increases the percentage of aleable leaf, these advantages are more than utweighed by the extra cost of fuel as compared ith coal or wood burners. Fuel consumption and osts of all three methods are recorded in some etail. H.L.

649. VIART, P.
Étude du comportement des feuilles de tabac au cours de la dessiccation en feuilles ou par plantes entières. **(A study on the behaviour of tobacco leaves cured as separate leaves or as whole plants.)** [English summary ⅓ p.]
*Ann. Inst. exp. Tabac Bergerac*, 1958, **3** (1): 125-63.

utting and curing whole plants resulted in lower ields, poorer quality and lower dry weight than arvesting separate leaves in 3 primings. Harvestg the plants whole but curing the leaves separely produced higher quality, but yields were ill low.

50. NEKRASOV, V. JA.
**A combined regime of fermentation of cigarette tobaccos.** [Russian.]
*Tabak*, 1958, **19** (4): 31-3.

ermentation at 50° C. was compared with a rocess involving temperatures above and then elow 50° C. in 3 stages. In the first phase of the tter process the air temperature in the chamber as first raised to 60–65° C. (i.e. till the temperature the tobacco reached 50–55° C.) for 24–40 hrs nd then reduced to 35° C. for 10–12 hrs; during e initial rise in temperature the R.H. fell to 5–50% and during the subsequent fall in temperare it rose to 57–65%. The second phase of rmentation was carried out at a constant temperare of 35° C. and at 65–70% R.H. for 4–6 days, e end of the phase being established when the xygen index reached 0·10 cm³. For the third hase the temperature was reduced to 22–25° C. t 70–75% R.H. for one day. Both the single and -stage processes lasted 9–10 days, but the new ethod showed several advantages over fermentaon at a constant 50° C.

### *Noted.*

651.

a BASNIN, S. A.
**Improvement in the method of baling mahorka.** [Russian.]
*Tabak*, 1958, **19** (4): 33-5, illus.
With the aid of an electric press.

b BUTLER, —.
**Characteristics of Bulgarian leaf.**
*Tobacco, N.Y.*, 1959, **148** (5): 34-5, illus.
Short descriptions of leaf of 17 varieties from 5 main areas.

c BUTLER, —.
**Characteristics of Turkish tobaccos.**
*Tobacco, N.Y.*, 1959, **148** (5): 28, 53, illus.
Short descriptions of leaf of 15 varieties from 4 main areas.

d CLAYTON, R. A.
**Properties of tobacco polyphenol oxidase.**
*Arch. Biochem. Biophys.*, 1959, **81**: 404-17, bibl. 22.
At least two enzymes are involved.

e DROLSOM, P. N., MOORE, E. L., AND GRAHAM, T. W.
**Inheritance of resistance to root-knot nematodes in tobacco.**
*Phytopathology*, 1958, **48**: 686-9, bibl. 13, illus.
Genetical aspects of resistance to *Meloidogyne incognita* var. *acrita.*

f DYMICKY, M., AND STEDMAN, R. L.
**Composition studies on tobacco. IV. Ergosterol, γ-sitosterol and a partially characterized steroidal glycoside from flue-cured leaves.**
*Tobacco, N.Y.*, 1959, **148** (5): 48-52, bibl. 11.
For Parts II and III see *H.A.*, 29: 625d and k; for Part V see 2651z below.

g ENDEMANN, W.
"Ergo" eine neue Schneidegut-Sorte. **(Ergo, a new bright tobacco variety.)** [Russian and English summaies ½ p. each.]
*Ber. Inst. Tabakforsch. Dresden*, 1958, **5**: 320-50, bibl. 10.
In all trials it has outyielded the common variety Wohlsdorfer Burley.

h HUMPHRIES, B.
**Mammoth tobacco raises leaf yield in Carolina.**
*Tobacco, N.Y.*, 1959, **148** (2): 11, 23, illus.
A mutant under trial with plants reaching 10–12 ft.

i JOHNSON, T.
**New disease-resistant leaf variety developed.**
*Tobacco, N.Y.*, 1959, **148** (2): 14, illus.
North Carolina variety 6047-3 is resistant to black shank and fusarium wilt.

j KURT, H., AND KAPETANOVIĆ, S.
**The essential oils from tobacco flowers of Herzegovina I. The essential oils from the tobacco inflorescence of Herzegovina II.** [Yugoslav?]

*Glasn. Dr. Hem. Teh. NR B i H*, 1957, **6**: 17-20 and 21-25, from abstrs in *Bull. sci. Cons. Acad. RPF, Belgrade*, 1959, **4**: 80 and 81.
Oils obtained by steam distillation and petroleum spirit extraction compared.

k McGrath, H., and Miller, P. R.
**Blue mold of tobacco.**
*Tobacco, N.Y.*, 1959, **148** (7): 22-4, (8): 20-4, (9): 24-8, illus., (10): 20-4 and (11): 20-4, bibl. 4½ pp.
See *H.A.*, 28: 3843.

l Mehta, S.
**Note on nutrition of tobacco.**
*Indian Tobacco*, 1958, **8**: 203-4.
Brief notes on N, P, K, Ca, Zn, Cu and Mg deficiency symptoms.

m Melamed, N., Nangniot, P., and Martens, P. H.
La comportement polarographique de la nicotine et de la nornicotine. (**Polarographic behaviour of nicotine and nornicotine.**)
*Bull. Inst. agron. Gembloux*, 1958, **26**: 103-15, bibl. 8.
A comparison of the characteristic waves of both constituents in various media.

n Mikhailov, M. K.
**A study of polyphenols in tobacco by filter paper chromatography. II. Derivatives of cinnamic acid. III. Enzymic oxidation of tobacco polyphenols. IV. Identification of kaempferol. VI. Effect of polyphenols in tobacco on reduction capacity of its water extract.** [English, with short Russian summaries.]
*C.R. Acad. bulg. Sci.*, 1958, **11**: 205-8, bibl. 14; 209-12, bibl. 13; 291-4, bibl. 6; and 395-9, bibl. 8.
See also *H.A.*, 27: 2615q, and 29: 1578 and 1581.

o Patel, G. C.
**Prospects of growing cigar wrapper tobacco in Dinhata area of North Bengal.**
*Indian Tobacco*, 1958, **8**: 225-32, bibl. 2, illus.
Results of qualitative examinations of tobacco grown experimentally since 1953 promising.

p Patel, M. S.
**Tobacco in Madras State.**
*Indian Tobacco*, 1958, **8**: 193-201, illus.
Production statistics by districts and notes on methods of producing various types of tobacco.

q Philip, A., and Joshi, B. G.
**Investigations on the control of tobacco caterpillars in the nursery and field. Popular summary.**
*Indian Tobacco*, 1958, **8**: 249, illus.
DDT 50% at 2 lb./100 gal. water in the nursery and at 4 lb./100 gal. in the field recommended.

r Pyriki, C., and Homann, W.
Über Chinatabake. I. Mitteilung. Die löslichen Kohlenhydrate. (**On Chinese tobaccos. 1st Communication. The soluble carbohydrates.** [Russian and English summaries ½ p. each.]
*Ber. Inst. Tabakforsch. Dresden*, 1958, **5**: 363-81, bibl. 26.
Analytical data on samples from China.

s Pyriki, C., and Moldenhauer, W.
Vergleichende Stickstoffbestimmungen nach Kjeldahl im Tabak. (**Comparative nitrogen determinations in tobacco by the Kjeldahl method.**) [English, French and Russian summaries about 25 lines each.]
Reprinted from *Nahrung*, 1958, **2**: 476-92.
Analytical procedures compared and discussed.

t Pyriki, C., and Müller, R.
Das Verhalten einiger flüchtiger *Nicotiana*-Alkaloide bei der Destillation und ihre quantitative Erfassung. (**The behaviour of some volatile *Nicotiana* alkaloids on distillation and their quantitative determination.**)
Reprinted from *Pharm. Zentralh.*, 1959, **98**: 7-19, bibl. 14.
On the separation and determination of nicotine, nornicotine and anabasine.

u Pyriki, C., and Müller, R.
Vergleichende papierchromatographische und reduktometrische Untersuchungen von Sacchariden im fermentierten Tabak unter besonderer Berücksichtigung des Vorkommens von Maltose. (**Comparative studies on the sugars in fermented tobacco by means of paper chromatography and the reductometric method, with special reference to the presence of maltose.**) [Russian and English summaries 8–10 lines.]
*Ber. Inst. Tabakforsch. Dresden*, 1958, **5**: 382-91, bibl. 4, illus.

v Reddi, K. K.
**Studies on tobacco leaf ribonuclease. III. Its rôle in the synthesis of tobacco mosaic virus nucleic acid.**
*Biochim. biophys. Acta*, 1959, **33**: 164-9, bibl. 19.
Ribonuclease activity greater in old leaves than young and increased following TMV infection.

w Rollin, L.
Le Rivet: tabac curieux. **(Rivet: an unusual tobacco variety.)**
*Rev. int. Tabacs*, 1959, **34**: 32-3.
A tall, highly productive and *Oidium*-resistant selection.

x Rowland, R. C., and Latimer, P. H.
**Flue-cured tobacco. IV. Isolation of solanesyl esters.**
*Tobacco, N.Y.*, 1959, **148** (4): 20-2, bibl. 3.
Part II was noted in *H.A.*, 29: 1598n.

y Sommereyns, G.
Note relative à des réactions nécrotiques provoquées par le virus A de la pomme de terre sur *Nicotiana glutinosa* L. **(A note on the necrotic response of *Nicotiana glutinosa* to infection by potato virus A.)**
*Parasitica*, 1959, **15**: 29-34, bibl. 6, illus.
This necrosis, apt to be confused with signs of ageing, has hitherto escaped detection.

z Stedman, R. L., and Rusaniwskyi, W.
**Composition studies on tobacco. V. Free and combined 3-β sterols of freshly harvested, aged or fermented tobaccos.**
*Tobacco, N.Y.*, 1959, **148** (14): 24-7, bibl. 6.
For Part IV see 2651f above.

2652.

a Stephens, R. L., and Weybrew, J. A.
**Isatin: a color reagent for nornicotine.**
*Tobacco, N.Y.*, 1959, **148** (15): 22-5, bibl. 13, illus.
Its use for the quantitative and qualitative determination of nornicotine in tobacco.

b Szirmai, J.
A burgonya Y-vírusának érbarnulást okozó változata a dohánykultúrákban. **(A variant of potato virus Y causing vein-browning in tobacco.)** [English, German and Russian summaries ½ p. each.]
*Növénytermelés*, 1958, **7**: 341-50, bibl. 5, illus.

c Vogelsang, A.
Der Windschutz im Tabakbau. **(Wind protection for tobacco.)**
*Tabakpfl. Österr.*, 1958, **9** (1): 14-16.
Effects of wind on tobacco and notes on protection.

d Yang, C.-H.
**A study of certain blue-fluorescent polyphenols in tobacco leaves, flowers and cigarette smoke.**
*Diss. Abstr.*, 1958, **19**: 949-50, being *L.C. Card No. Mic.* 58-3884 of 116 pp.
Scopoletin, chlorogenic acid, a coumarin-glycoside and a "chlorogenic acid-like" depside.

## MISCELLANEOUS TEMPERATE AND TROPICAL PLANTS.

### *Condiment and spice plants.*

(*See also* 2393, 2600h, 2710n.)

653. Mühle, E.
Untersuchungen über wirtschaftlich besonders bedeutsame Krankheitserreger und Schädlinge der Arznei- und Gewürzpflanzen und ihre Bekämpfung. **(Studies on economically important diseases and pests of medicinal and spice plants and their control.)**
*Dtsch. Gartenb.*, 1959, **6**: 24-5, bibl. 7, illus.
mong virus diseases mentioned those of *Digitalis nata* and *Plantago lanceolata* are of particular portance; their symptoms are described. The ology and control of mint rust (*Puccinia menthae*) nd of *Lygus campestris* and *L. kalmi* on fennel are so discussed in some detail.

654. Obolensky, G.
Étude sur l'extraction de la vanille par les ultra-sons. **(Study of vanilla extraction by ultra-sonic treatment.)** [English summary 11, German 14, lines.]
*Qual. Plant. Maveg.*, 1959, **5**: 344-66, bibl. 36.
he most effective of several ultra-sonic treatments sted was the application, to material with 16% oisture content, of 500 kHz at 10·5 W/sq. cm. for 12 min., using 50° alcohol as the solvent. This yielded 94% of the vanillin and 85% of the oleoresins normally obtained in 12 hrs by the classical extraction method. When the moisture content of the material was 12·8%, the percentage extractions were 67·7 and 71·4 respectively. Material which had been ultra-sonically irradiated some months previously, and now contained 8% of moisture, gave higher values of both vanillin and oleoresins than those from ordinary material with a 12·8% moisture content. The flavour and aroma of the product were improved by ultra-sonic extraction. [For earlier work see *H.A.*, 29: 1602.]

### *Drug plants.*

(*See also* 2653, 2668, 2710s, t, w.)

2655. Bisset, N. G.
**The occurrence of alkaloids in the Apocynaceae.**
*Ann. bogor.*, 1958, **3**: 105-236, bibl. 42.
A detailed review is presented on the occurrence of alkaloids in the Apocynaceae; the plants discussed are arranged according to the taxonomic classification of Pichon. There is evidence that alkaloidal material is probably present in about

60 genera, but only about half these include species in which it is a major secondary plant product. The formation of at least small amounts of basic substances seems to be a fairly general function in these plants. [Author's summary.]

2656. Ahtarov, B., Bojčinov, A., and Maždrakov, P.
**Trials on the effect of artificial fertilizers on the alkaloid content of plants.** [Bulgarian, with Russian summary.]
*Farmacija*, 1957, **7** (1): 37-9, from *Ref. Ž.* (*Biol.*), 1958, No. 6, Abstr. 25,226.

The effect of fertilizers on alkaloid content was studied in *Atropa belladonna*, *Datura stramonium* and *Hyoscyamus niger*. Nitrogen increased the alkaloid content in *A. belladonna* and *D. stramonium* by 25%, and both N and P raised it in *H. niger* by 20%. Potash, however, reduced the alkaloid content of all 3 species.

2657. Dalev, D., and others.
Certains essais sur l'influence de l'amendement sur la teneur en alcaloïdes et le rendement de l'*Atropa belladonna* en Bulgarie. **(Experiments on the effect of fertilizers on the alkaloid content and yield of *Atropa belladonna* in Bulgaria.)** [Russian summary 8 lines.]
*C.R. Acad. bulg. Sci.*, 1958, **11**: 419-22.

Responses of *Atropa belladonna* to different combinations of N, P and K with FYM showed the effect of fertilizers on alkaloid content to be irregular. The highest yield of fresh leaves was obtained with 2 tons FYM, 20 kg. ammonium nitrate and 40 kg. superphosphate per 0·1 ha.

2658. Reifer, I., Rumińska, A., and Kąszkowski, J.
Wpływ żelazicyjanku potasu na *Datura stramonium* L. Plon liści zawartość alkaloidów i niektórych innych składnikow. **(The effect of potassium ferricyanide on *Datura stramonium*. Yield of leaves and content of alkaloids and some other compounds.)** [English and Russian summaries.]
*Acta biochim. polon.*, 1956, **3**: 209-24, from *Ref. Ž.* (*Biol.*), 1958, No. 5, Abstr. 20,560.

Soaking the seed in 0·05, 0·1 and 0·2% potassium ferricyanide advanced growth and development and increased the content of alkaloids, total N and citric acid, especially during the first developmental stage. The alkaloid content of mature leaves increased in proportion to the concentration of the chemical, but for young leaves the optimum concentration was 0·1%, 0·2% causing a noticeable reduction in the alkaloid content. The dry matter content of the treated plants was also increased. Potassium ferricyanide did not materially affect the content of soluble N, reducing sugars or malic acid.

2659. Steinegger, E., and Gessler, F.
Beeinflussung von Wachstum und Wirkstoffgehalt bei *Datura* durch artfremde Stoffe. **(The growth and content of active principles in *Datura* as affected by foreign substances.)**
*Scientia pharmac.*, 1956, **24** (1): 5-11, from *Ref. Ž.* (*Biol.*), 1958, No. 5, Abstr. 20,561.

Penicillin increased the growth and percentage content of alkaloids in *Datura stramonium* var. *stramonium* growing in both pot and water cultures. The total alkaloid content of the leaves and stems increased five-fold. Terramycin had little effect on either growth or alkaloids. Ascorbic acid used alone or added to penicillin or terramycin affected the plants adversely. Kellin also had a retarding effect. Santonin and coumarin increased plant growth but retarded alkaloid formation. Treatment with β-indolylacetic acid increased growth and alkaloid formation in water culture. Maleic hydrazide retarded growth and alkaloid formation.

2660. Sayed, M. D.
**A study of the influence of gibberellic acid on *Digitalis purpurea* L. and *Fagopyrum esculentum* Moench.**
*Diss. Abstr.*, 1958, **19**: 779, being *L.C. Card No. Mic.* 58-3455 of 108 pp.

When *Digitalis purpurea* was treated with gibberellic acid (100 p.p.m.) some plants bolted, but did not flower. Leaves were longer and thinner than those on untreated plants. The glycoside content in samples collected from treated plants was higher than that of untreated plants at all harvests, being at a maximum at the first harvest (17 July). In treated plants the total carbohydrate and chlorophyll percentages were higher in treated than in control plants. Crude fibre determinations revealed a higher percentage in treated plants at the time of the first harvest, but this difference became less pronounced later.—Ohio St. Univ.

2661. Kljajić, R.
*Septoria digitalis* Pass. parazit lekovitih *Digitalis* spp. u Jugoslaviji. **(*Septoria digitalis* a pathogen of the medicinal *Digitalis* spp. in Yugoslavia.)** [English summary 3½ pp.]
*Posebna Izd. Inst. Zašt. Bilja* **9**, 1958, pp. 53, bibl. 41, illus.

The fungus *S. digitalis*, prevalent in Yugoslavia, was studied in 15 species of *Digitalis*, including two, *D. lanata* and *D. purpurea*, grown for medicinal use. All species were found to be susceptible, *D. lanata* being the most and *D. ambigua* the least. In laboratory and glasshouse trials bordeaux mixture at 0·5, 1·0 and 2·0% and captan (Orthocide 50) or zineb both at 0·3% have given good control. Seed treatment with Orthocide 75 or TMDT was satisfactory, but Ceresan, though effective, was phytotoxic.

662. Shrum, J. E., Jr., Soderholm, P. K., and Haun, J. R.
**Preliminary studies of *Dioscorea* growth in Florida.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 315-17, bibl. 4, illus.

Veight increases of the tuberous roots of *Dioscorea* pecies grown at Miami were greater in the second nd third years than in the first year. At the third nd final harvest the greatest weight gain was btained from *D. composita* P.I. 202324, followed y *D.* sp. P.I. 209279, and then by *D. floribunda* .I. 200118. The sapogenin content of P.I. 200118 nd P.I. 202324 increased each year up to the hird-year harvest, and that of P.I. 209279 increased p to the second-year harvest. Sapogenin yields ere greater from vines that were supported than rom unsupported vines. It is concluded that *. composita* P.I. 202324 was the type best adapted the environment of this trial.—U.S. Plant ntrod. Stat., Miami.

663. Zoz, I. G.
**Complex utilization of *Gomphocarpus fruticosus.*** [Russian.]
*Bot. Žurnal*, 1958, **43**: 1620-7, bibl. 25, illus.

he stems, leaves, seeds and their floss and roots n be variously used to provide a fibre substitute r kapok, rubber and cardiac glycosides. The ycosides found in the roots, leaves and seeds are scussed, and prospects for growing the crop in Soviet Union are considered.

64. Burgueño Cela, A.
Estudio farmacognóstico de la bardana. **(A pharmacognostic study of burdock.)**
*Farmacognosia*, 1958, **18**: 207-62, bibl. 58, illus.

n extraction method is described for the active rinciple in burdock (*Lappa communis* [*Arctium ppa*]), for use against gram-positive bacteria, otably *Staphylococcus aureus.* The freshly harested seed germinated in 12 days, but that stored ver winter required 5 weeks or more. This period as reduced to 2–3 weeks by leaving the seed for 4 hrs in ice. Treatment with hydrogen peroxide 0 vol.) was slightly less effective. Hitherto the oot has been used commercially, but the active rinciple is more abundant in the leaves, particurly during flowering.

665. San Martín, R.
Sobre el valor estrógeno en algunas especies vegetales. Actividad del *Levisticum officinale.* **(The oestrogen value of some plant species. Activity of *Levisticum officinale.*)**
*Farmacognosia*, 1958, **18**: 179-86.

list of plant sources of oestrogen is given, also a st of *Umbelliferae* containing allied substances. he preparation and evaluation of extracts from *evisticum officinale* are described.

2666. Felklová, M., and Kocourková, E.
Sledování obsahu rutinu u rdesna peprníku (*Polygonum hydropiper* L.) během vegetační doby. **(Studies on the rutin content of *Polygonum hydropiper* during growth.)** [English and Russian summaries ½ p. each.]
*Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba*, 1958, **31**: 1277-88, bibl. 23.

*Polygonum hydropiper*, growing wild in Czechoslovakia, is used for medicinal purposes. The highest content of rutin, about 9% of dry weight, occurred in young plants before stem elongation, and the lowest in mature plants. On the other hand, the greatest total quantity, 1·0954 g. per plant, was found at the beginning of ripening, and the least in the young plants. Rutin accumulated mainly in the leaves.

2667. Atal, C. K.
**A pharmacognostic study of *Withania somnifera* Dunal.**
*Diss. Abstr.*, 1958, **19**: 1059, being *L.C. Card No. Mic.* 58-3899 of 103 pp.

Characteristics of root tissue were compared in roots from commercial sources and from young plants. Several unidentified alkaloids were extracted from the plant. Paper-chromatographic methods showed that proline, valine, alanine, tyrosine and glycine were present in the berries.—Univ. Conn.

### *Essential oils.*

(*See also* 2651j, 2710c, e, l, p.)

2668. Kydrev, T., and Jankulov, J.
**The physiological characteristics of the seeds of certain medicinal and essential oil plants.** [Russian, with German summary 6 lines.]
*C.R. Acad. bulg. Sci.*, 1958, **11**: 423-6, bibl. 2.

The seeds of 8 species (*Foeniculum officinale*, *Gypsophila paniculata*, *G. trichotoma*, *Melissa officinalis*, *Origanum majorana*, *Phacelia tanocetifolia*, *Pimpinella anisum* and *Valeriana officinalis*) were divided into groups according to colour, and their absolute weight, germination, water absorbing capacity and respiratory activity were studied. It was found that seed colour is indicative of certain physiological properties, which varied for the different groups. Dark seeds were heavier and germinated better than light coloured seeds.

2669. Kurt, H., and Devetak, Z.
Ein Vorschlag zur verbesserten Gewinnung des ätherischen Öles aus Wacholderbeeren. **(A suggestion for improved extraction of the essential oil from juniper berries.)**
*Glasn. Dr. Hem. Teh. NR B i H*, 1957, **6**: 53-8, from abstr. in *Bull. sci. Cons. Acad. RPF, Belgrade*, 1959, **4**: 81.

The essential oil should be obtained by distillation immediately after drying the berries and the residue then used for alcohol production.

2670. Pussard, R.
Biocénose des lavandes. 2. Tordeuses nuisibles aux abords des limites, altitudinales ou culturales, de l'aire de ces plantes. **(Ecology of lavenders. 2. Harmful tortrix moths of the marginal habitats, altitudinal and cultural, in which these plants are grown.)**
*C.R. Acad. Agric. Fr.*, 1958, **44**: 768-72, bibl. 8.

The life histories of *Archips* (*Cacoecia*) *pronubana* and *Amelia* (*Tortrix*) *viburnana* are described. The former is easily controlled by the commoner insecticides and is particularly vulnerable in the newly emerged caterpillar stage. [For Part 1 see *H.A.*, 27: 3678.]

2671. Korneva, E. I.
**Variability of mint grown from root and stem cuttings.** [Russian.]
*Agrobiologija*, 1958, No. 4, pp. 125-6.

Plants grown from root cuttings were more vigorous and productive, but those from stem cuttings, especially from the apical end, established themselves and developed more rapidly and flowered earlier.

2672. Salgues, R.
Le basiliquage des bourgeons foliaires et floraux de quelques labiées par *Eriophyes thomasi* Nalepa et *Eriophyes menthae* Molliard. **(Gall formation in leaf and flower buds of certain labiates by *Eriophyes thomasi* and *E. menthae*.)**
*Qual. Plant. Maveg.*, 1959, **5**: 283-96, bibl. 12.

Reactions of thyme to *E. thomasi* and of peppermint to *E. menthae* are described. A quantitative comparison was made of the composition of normal and galled shoots of marjoram plants attacked by *E. thomasi*, and of peppermint plants attacked by *E. menthae*. Although infested peppermint plants yielded a higher quantity of essential oil than normal plants, their final yield of menthol and esters was below normal, and their content of the undesirable compound menthofuran in the oil was more than twice the normal for fresh, and more than 7 times the normal for dried, plants.

2673. Pravdoljubova, A. A.
**The oil content of jubilee (eugenol) basil in relation to the stage of the development of the plant in Georgia.** [Russian.]
*Tr. Vses. n.-i. In-ta sint. i natur. dušistih Veščestv*, 1957, No. 3, pp. 67-78, from *Ref. Ž.* (*Biol.*), 1958, No. 9, Abstr. 39,555.

Between bud formation and full seed maturity of this plant [presumably *Ocimum* sp.] the yield of oil fell from 18·2% to 0·33%, calculated on the fresh weight basis of the inflorescence. The highest oil yield from the leaves, 0·91%, was obtained when the seed started to ripen in the lower whorls of the central inflorescence. The oil content increased up to this phase; it then decreased slowly, but remained at a fairly high level, 0·67%, even in the later stages of development. The yield from the total green mass followed a similar course. The maximum total oil yield per plant was reached during seed ripening, when the bracts in the lower half of the central inflorescence were turning brown. In Georgia 2 crops of basil per year can be obtained.

### *Fibres.*

(*See also* 2663, 2710g.)

2674. Jaranowska, B.
Doświadczenia odmianowe z konopiami przeprowadzone w latach 1951-1953. **(Variety trials with hemp, carried out in 1951-1953.)** [English summary 1 p.]
*Roczn. Nauk rol., Ser. A*, 1958, **78**: 219-68, bibl. 11.

Morphological characteristics, straw and seed yields and fibre quality were studied in 8 hemp varieties belonging to 3 types by means of randomized block trials in 14 locations. While the 3 types used (Northern, Central and Southern European) differed considerably in their reaction to changes in soil, climate and cultural treatment, the reactions of varieties within these types varied only slightly. The Southern type gave the highest yield of straw, and of its varieties the Hungarian hemp was the best suited to Polish conditions, producing the best quality fibre and an adequate seed yield. Polish varieties also produced sufficient seed and were less affected by poor cultural treatment, especially the variety SWHN. Both straw yield and fibre quality were low in the Northern type.

2675. Demkin, A. P.
**The yield and quality of the fibre in southern hemp in relation to conditions of growth.** [Russian.]
*Doklady vsesojuz. Akad. seljsk. Nauk*, 1958, **23** (10): 25-30.

Southern varieties of hemp produce higher yields of total and long fibre with better quality and greater strength than mid-Russian varieties. The highest yield of good quality fibre was obtained from early, continuous drilling at 100 kg. seed per ha., but fibre strength was greatest from plants sown in bands 30 cm. apart at 50 kg. seed per ha. Both yield and quality were highest from crops harvested at the end of flowering.

76. MOHÁCSI, T., AND BÓCSA, I.
Kendermagtermesztési kísérletek lápi és ásványi talajokon. (**Experiments in hemp seed production on peaty and mineral soils.**) [English and Russian summaries ½ p. each.]
*Növénytermelés*, 1958, **7**: 297-304, bibl. 4.

mall plot experiments were carried out on a grey rest soil in 1954–56 and large plot trials on a aty soil in 1955–57. The highest seed yields were btained on the small plots at a spacing of 70×70 n. On the large plots a seed rate of 4 kg./cad. old [=1·42 ac.] with the plants spaced 50 cm. part in rows 70 cm. apart was the best. The nal results showed no significant difference etween these 2 spacings. The current practice of ing 8 kg. seed per cad. hold in rows 48 cm. apart oved wasteful, yield increases of 100–150 kg./cad. old being feasible, if 4 kg. seed were sown in rows cm. apart and the plants were subsequently inned to 50 cm. apart in the rows.

77. OSTAPENKO, V. I.
**Variation in the sex ratio of hemp induced by an electric current in the soil.** [Russian.]
*Fiziol. Rast.*, 1958, **5**: 461-3, bibl. 12.

ssing an electric current between zinc and carbon ectrodes placed 5 and 10 m. apart in the soil duced germination and retarded growth and wering in hemp. Polyphenoloxidase and peroxise activities were also reduced, especially with e electrodes 5 m. apart. The activity of these dases was affected most in the female plants, in ich it was already lower than in the male plants. nearly all cases the treatment increased the male: male plant ratio, and this increase was en more pronounced in the progeny.

78. SUSTRINA, V. Ė.
**The effect of external conditions on the sex ratio in hemp.** [Russian.]
*Agrobiologija*, 1958, No. 4, pp. 130-2.

earlier work N nutrition was found to be one the factors affecting sex ratio in hemp. Results e given of seed treatments at 0 to 5° and 10 to 5° C. with extracts from inflorescences of male nd female hemp plants and with solutions of mmonium nitrate, ammonium sulphate, superhosphate and potassium chloride.

79. ECHEVERRY, R.
El cultivo del ramio. (**Cultivation of ramie.**)
*Agric. trop. Bogotá*, 1958, **14**: 698-704.

amie was grown in ancient Egypt for textiles. *oehmeria nivea* produces finer and better quality res than *B. utilis*. The former grows extremely ell in Colombia at an average temperature of 3° C. and is suitable for making anti-erosion rriers in coffee plantations. It requires light ils, and in dry areas irrigation is necessary. ropagation is simplest from rhizomes, but seeds, uttings, layers or roots may also be used. The crop is harvested every 4–6 months. Superphosphate and potassium sulphate are recommended as fertilizers.

### *Hops.*

(*See also* 2367d, 2710a, b, f, i, o, v, 3094.)

2680. ZATTLER, F.
Aus der Versuchs- und Forschungstätigkeit auf dem Hopfenversuchsgut in Hüll im Jahre 1957. (**Annual Report of the Experimental Hop Farm at Hüll for 1957.**)
*Hopfen Rundschau*, 1958, **9**: 197-201, 219-21, bibl. 5, illus.

Work was carried out at Hüll and elsewhere on the following, among other, subjects, in co-operation with the Bavarian Institute of Plant Husbandry and Plant Protection and with the German Association for Hop Research: Cone dieback (Doldensterben): the trouble was given a new name following the discovery that it is primarily due to a physiological unbalance, and not to *Cladosporium* sp. with which the condition is commonly associated. Biology and control of gall midges (*Chinodiplosis sp.*) on the cones. Wilt diseases: studies of the fungi and nematodes responsible; modes of transmission under natural conditions; methods of inoculation; time of natural infection; and chemical control. Breeding, including the production of tetraploid plants, and the testing of new varieties.

2681. SCHMIDT, K.
Die deutschen Hopfensorten. (**The German hop varieties.**)
*Hopfen Rundschau*, 1958, **9**: 149-50, 152-3, 167-8, 186-7, 202-3, 250-1, 306-9, illus.

Illustrated descriptions are given of the hop varieties Saazer, Deutscher Frühhopfen, Spalter, Hallertauer Mittelfrüher, Hersbrucker Spät, and Rottenburger Spät, together with a table summarizing their characteristics. The hop growing areas of Germany are also discussed.

2682. WILSON, J. F.
**Density, Defender and Janus: three new wilt-tolerant hops.**
**Notes on three new wilt-tolerant hops.**
*A.R. E. Malling Res. Stat. 1958*, 1959, **A42**: 110-15, bibl. 6, illus., and 161-2.

Detailed morphological descriptions are given of these 3 new wilt-tolerant varieties now released to hop growers. Their behaviour in brewing trials over several seasons is summarized [see *H.A.*, 29: 655 and earlier]. Density (formerly D1) is a late hop of vigorous habit and high yield potential, producing small, compact cones likely to withstand damage by machine picking; it is, however, very susceptible to downy mildew. Defender (D3), an early hop of vigorous habit and good yield potential, also shows above-average susceptibility to downy mildew. Janus (J2) is a mid-season hop of moderate vigour and yield potential with cones adapted to machine picking; being only moderately susceptible to downy mildew normal control measures should suffice.

The second paper gives a short, popular account of these 3 new varieties.

2683. ZATTLER, F.
Über die Bedeutung des Mikronährstoffes Bor für die Hopfenpflanze. Mit Untersuchungen über Schäden durch Borüberdüngung. **(On the importance of the micronutrient boron for the hop plant. With studies on injuries caused by excessive boron manuring.)**
Reprinted from *Brauwelt*, 1958, Vol. **98**, Nos. 71 and 72, in *Hopfen Rundschau*, 1958, **9**: 344, 346-8, 362-4, bibl. 9, illus.

Two experiments, following observations of injury in a hop garden showed that boron applications to hops must be strictly limited. Where a complete fertilizer, which includes trace elements, is not used, the supply of borax should not exceed 5–10 kg./ha. This amount is equivalent to 14–28 mg. per plant, if the chemical is spread evenly and the hop plants each occupy 2·2 sq. m.

2684. BONDARENKO, V. M., AND PARŠIKOV, V. M.
**The effect of manganese on the physiology and productivity of hops.** [Ukrainian, with English and Russian summaries.]
*Dopovidi AN URSR*, 1957, No. 2, pp. 196-9, from *Ref. Ž.* (*Biol.*), 1958, No. 9, Abstr. 39,460.

$KMnO_4$ increased hop yields by 15·9%, but the simultaneous application of $KMnO_4$ and lime on a slightly acid loam was less effective. Mn induced an intensive translocation of sugars, and their content in the leaves of the lower tiers (1–1·5 m.) was reduced during flowering. Growth and the chlorophyll content of leaves were increased.

2685. LEGG, J. T., AND ORMEROD, P. J.
**Research on hop virus diseases at East Malling.**
*A.R. E. Malling Res. Stat. 1958*, 1959, **A42**: 157-60.

Evidence on the mode of spread of nettlehead is conflicting; the work reviewed suggests either that the virus is spread by a mobile insect or mite that only occasionally feeds on hops, or that the virus is soil-borne. No decisive control measures can be recommended, but the removal of affected plants followed by replanting can be of great value in prolonging the economic life of a plantation. The symptoms of split leaf blotch are described, and particular attention is drawn to a 50% reduction of yield from affected plants of the variety Fuggle. [Authors' summary.]

2686. PETRLÍK, Z., AND ŠTYS, Z.
Úsporné postřiky v ochraně chmele před peronosporou. **(Economic sprays for the protection of hops against downy mildew.)**
*Chmelařství*, 1958, **31**: 186-7, illus.

In 1958, when the downy mildew (*Pseudoperonospora humuli*) attack was relatively mild, low-volume spraying was found satisfactory. The most effective material was Kuprikol [see also *H.A.*, 28: 1645 and 3882], which, at 3% concentration and using 500 to 700 l. per ha. with a droplet size of 50–170 μ, gave results similar to those obtained by the usual concentration using 1,500 to 2,200 l. per ha. with a droplet size of 170–600 μ.

2687. TALBOYS, P. W.
**Some mechanisms contributing to *Verticillium*-resistance in the hop root.**
*Trans. Brit. mycol. Soc., 1958*, **41**: 227-41, bibl. 21, illus.

Observations on infection of the roots of wilt-sensitive and wilt-tolerant hop cultivars by mild and virulent strains of *Verticillium albo-atrum* show that initial invasion of the host may be retarded by lignification of cell-walls and occlusion of penetrating hyphae by sheathing deposits in the epidermal and cortical cells to an extent which appears to be determined by virulence of the pathogen. Exclusion of the fungus from the pericycle and vascular tissues seems to depend upon deposition of suberin in the endodermal cell-walls, and this is associated with invasion of the cortex by the pathogen much more frequently in tolerant than in sensitive cultivars. [From author's summary.]—E. Malling Res. Stat.

2688. STAPLEY, J. H.
**Hop aphis and its influence on downy mildew.**
*Comm. Gr*, 1959, No. 3304, p. 1071.

In trials, in which Metasystox and 4 experimental systemic insecticides were applied to 3 hop varieties, it was found that a high level of downy mildew infection was associated with poor aphid control. It would thus appear that a good fungicidal programme may be rendered ineffective unless coupled with good aphid control. It was also noteworthy that the extent to which the 3 varieties absorbed systemic insecticides from the soil varied positively with their susceptibility to mildew.—Fernhurst Res. Stat.

2689. PROČAJEV, V. P.
Vli některých chemických látek na zachování barvy chmele. **(The effect of certain chemicals on the preservation of the colour of hop cones.)**
*Chmelařství*, 1958, **31**: 148-9.

To prevent the discoloration of cones during unfavourable weather or when picking is delayed, spraying was tried in Russia. Of 5 chemicals used in 1957, Prajšnikov's mixture ($KMnO_4$) and bordeaux mixture preserved the yellow-green lour for one month in 80% of the cones com- red with 10% in the controls. The total resin ntent was not affected substantially by any of the rays. An editorial note points out that certain tilizers also affect cone colour.

90. PETŘÍČEK, D.
Chmelový pektin. **(Hop pectin.)**
*Chmelařství*, 1958, **31**: 158.

e method of estimation is described. In cones Clone 126 and Clone 72 the pectic fraction ried from 7 to 10% and pectic acid from 2·5 to . The content of pectic substances declined th maturity.

### *Plant sources of plant protection substances.*

(*See also* 2394, 3109.)

91. MARUZZELLA, J. C., AND FREUNDLICH, M.
**Antimicrobial substances from resistant and non-resistant seeds.**
*Nature*, 1959, **183**: 972-3, bibl. 8.

tracts, using water and organic solvents, of rious seeds were tested against bacterial and gal cultures. No variety, resistant or non- istant, of bush bean and oat possessed any ibiting activity. Two out of 5 cantaloup ieties showed slight activity. Seeds of the resis- t cabbage varieties, Jersey Queen and Detroit, sessed greater amounts of antimicrobial sub- nce than those of the non-resistant varieties nish Ball Head and Penn State Ball Head. It is gested that the active substance in the seeds is pine, which is known to be present in cabbage nts.—Long Is. Univ., Brooklyn.

92. VIRTANEN, A. I.
**Antimicrobial substances in cultivated plants.** [German?]
*Angew. Chem.*, 1958, **70**: 544-52, bibl. 42, from abstr. in *J. Sci. Food Agric.*, 1959, **10**: i-134.

e structural characteristics, occurrence and operties of active substances in clover, carrots, matoes, onions, garlic and other plants are scribed.

93. ARK, P. A., AND THOMPSON, J. P.
**Control of certain diseases of plants with antibiotics from garlic (*Allium sativum* L.).**
*Plant Dis. Reptr*, 1959, **43**: 276-82, bibl. 10, illus.

ust or spray applications of a commercial garlic wder protected cucumbers against downy mildew *seudoperonospora cubensis*), scab (*Cladosporium cumerinum*) and angular leaf spot (*Pseudomonas chrymans*); bean plants were protected against thracnose (*Colletotrichum lindemuthianum*) and cterial blight (*Pseudomonas phaseolicola*). Peach uits and potted almond and apricot plants were otected from brown rot (*Sclerotinia fructicola*) by sprays and dusts containing garlic extracts. Garlic powder retained its antibiotic properties for 3 years when stored at room temperature.—Univ. Calif., Berkeley.

2694. IRVINE, J. E., AND FREYRE, R. H.
**Occurrence of rotenoids in some species of the genus *Tephrosia*.**
*J. agric. Food Chem.*, 1959, **7**: 106-7, bibl. 8.

Leaves, stems, roots, seeds, and pods of 16 species of *Tephrosia* were successfully assayed for rotenoids, using a modification of the Gross-Smith red color test. While 14 species contained some rotenoids, only 5 contained rotenoids in their leaves. *T. vogelii* had the highest leaf rotenoid content (ranging from 0·65 to 4·25%), and appears to be a prospective commercial source of rotenone and rotenoids. [Authors' abstract.]—U.S.D.A., Mayaguez, P.R.

2695. ORLANDO, A.
O valor do óleo de quenopódio e das plantas de "erva de Santa Maria"—*Chenopodium ambrosioides*, L. var. *anthelminticum* (L.) Gray no controle a nematoides que atacam raizes de vegetais cultivados. **(The value of chenopodium oil and of plants of *Chenopodium ambrosioides* var. *anthelminticum* in the control of nematodes attacking the roots of cultivated plants.)** [English summary ½ p.]
*Arq. Inst. biol. S. Paulo*, 1957, **24**: 69-80, bibl. 9, illus.

Although extracts of *Chenopodium ambrosioides* var. *anthelminticum* are effective against various worm parasites of animals and man, susceptible pumpkin and tomato varieties were not protected from root-knot nematodes, either by inter-row planting with this species, when it was either left to grow or cut and incorporated in the soil, or by soil treatment with an aqueous extract or with chenopodium oil with a resin carrier.

2696. CADMAN, C. H.
**Some properties of an inhibitor of virus infection from leaves of raspberry.**
*J. gen. Microbiol.*, 1959, **20**: 113-18, bibl. 23.

Raspberry leaves contain a substance which prevents the infection of plants by viruses when it is mixed with the inoculum. It is lost on dialysis, precipitated by nicotine or added protein, unaffected by boiling or freezing, and is probably a phenolic tanning agent. Extracts from peach or apple leaves contain less of such substances than do those from leaves of plum, cherry, raspberry or strawberry. The degree to which virus infection is inhibited by tanning substances from raspberry or other sources depends on the virus and not on the species of test plant. Raspberry tannin and tannic acid combine irreversibly with some viruses, but with others the combination is readily reversed by dilution or increase in pH value. The infectivity of extracts made from raspberry leaves containing raspberry ring spot or beet ring spot viruses varied with the concentration of tannin present and the pH value. The amount of virus sedimented by centrifuging such extracts at low speed decreased with increase of pH value. Extracts made with 2·5% nicotine in water were usually more infective than those made with alumina or phosphate buffer (pH 8), and much more infective than those made with water. Both viruses are precipitated by acetone or ammonium sulphate from extracts of infected raspberry leaves made with nicotine or alumina; beet ring spot virus was detected serologically in such preparations from infected raspberry leaves. [From author's summary.]

### *Rubber plants.*

(*See also* 2663.)

2697. KALANTYR', M. S.
**Profuse early fruiting of *Eucommia*.** [Russian.]
*Priroda*, 1959, **48** (3): 100-1, illus.

By ringing some side shoots on the lower branches of young *Eucommia* trees early fruiting was induced on these shoots, and good quality seed obtained. Later, when the whole tree entered into bearing, the ringed shoots were removed during pruning.

2698. MARZOCCA, A., AND CASO, O. H.
Ensayo de densidad de siembra con *Taraxacum kok-saghyz*. **(Experiment on sowing density for *Taraxacum kok-saghyz*.)**
*Rev. Invest. agríc. B. Aires*, 1958, **12**: 345-52, bibl. 14.

From winter sowing in bands 10 cm. wide, alternating with 35-cm. strips of bare soil, the highest rubber yield per unit area was from a seeding rate of 8 kg./ha., followed closely by that from 12 kg./ha. The lowest yield was from the lowest sowing density tested, i.e. 4 kg./ha.

### *Seed oils.*

(*See also* 2710h, m, q, r, 2735, 2913, 2914, 2917k, 2980.)

2699. DOUGHTY, H. N.
**Changes in castorbeans during five years of storage.**
*Mktg Res. Rep. U.S. Dep. Agric.* **264,** 1958, pp. 29, 25 cts.

Castor beans stored well, the oil from beans stored for 2 years remaining grade No. 1, and from 5-year-stored beans grade No. 3. Oil and moisture contents slowly declined during storage. Cracked and broken beans yielded more oil per bushel, but of poorer quality, than sound beans.

2700. POPOFF, A., AND MAŽDRAKOV, P.
Feldversuche mit *Nicandra physaloides* Gärtn. und Untersuchungen ihres Samenöls. **(Field trials with *Nicandra physaloides* and studies on its seed oil.)** [Russian summary $\frac{1}{4}$ p.]
*C.R. Acad. bulg. Sci.*, 1958, **11**: 193-6, bibl. 8.

In Bulgaria *N. physaloides* has a limited distribution as a semi-cultivated, self-sown plant. Field experiments have shown that, when seed is sown at the beginning of May, by the middle of September 23–27 kg./are [100 sq. m.] of fruit or 14–16 kg. of seeds containing 16·5% oil are obtained. The oil resembles tobacco seed oil in composition.

2701. MAŽDRAKOV, P., AND POPOFF, A.
Versuche für den Anbau der Pflanzen *Perilla ocimoides* L. und *Perilla nankinensis* Decaisne und Untersuchungen des aus ihnen gewonnenen Öle. **(Trials on the cultivation of *Perilla ocimoides* and *P. nankinensis* and studies on their oils.)** [Russian summary $\frac{1}{3}$ p.]
*C.R. Acad. bulg. Sci.*, 1958, **11**: 197-200, bibl. 5.

Two varieties of *P. ocimoides* and the ornamental *P. nankinensis* were found to grow satisfactorily in Bulgaria, but, before the crop can be more widely distributed, forms of *P. ocimoides* with a shorter vegetative period will have to be developed. The seed oils from the two species were similar in composition. The oil of *P. nankinensis* in spite of its lower iodine number showed better drying qualities.

2702. HOROWITZ, B., AND KLEINIG, C. R.
**Safflower trials in Australia.**
*Tech. Pap. C.S.I.R.O. Div. Plant Ind.* **11,** 1958, pp. 19, bibl. 29, illus.

In regional tests with safflower throughout Australia promising results were obtained at Biloela and on the Darling Downs in southern Queensland, and in the north-west part of New South Wales. Details are given of seed and oil yields recorded, and economic returns are compared with those obtained from linseed.

2703. THOMAS, C. A.
***Fusarium* infection of safflower roots on acid soil.**
*Plant Dis. Reptr*, 1959, **43**: 416-17, bibl. 3, illus.

Soils on which safflower grew poorly and showed root infection, mainly by *Fusarium oxysporum*, had a pH of 4·3–5·0, whereas soils on which good growth and no infection occurred had pH values of 6·2–7·2. Hydrated lime applied to the acid soils at 1,500 to 3,000 lb./acre gave complete control of the root infection in both greenhouse and field trials.—U.S. Dep. Agric., Beltsville, Md.

04. WILSON, E. M., AND ARK, P. A.
**Acti-dione as a control of seed-borne safflower rust.**
*Phytopathology*, 1958, **48**: 640, bibl. 1.

y soaking safflower seeds, 8% of which were fected with rust (*Puccinia carthami*), for 30 min. Acti-dione solutions of 1–20 p.p.m., complete ntrol of the disease was obtained without ducing germination or seedling growth. At 100 p.m. germination was retarded and reduced by -6%, and at 1,000 p.p.m. the reduction was 82% d the retardation was greater. [See also *H.A.*, 27: 96.]

05. MUELLER, K. E., AND LANGE, W. H.
**Stem borer found on safflower.**
*Calif. Agric.*, 1959, **13** (3): 4-5, illus.

an experimental safflower plot, there was 100% festation with *Melanagromyza virens*, but there s as yet been little evidence of economic damage commercial fields grown under dry-land condi- ons. There were indications that later plantings safflower were more susceptible to fly attack, d that relatively succulent plants grown under igation were favoured by the flies. Two para- es, *Halticoptera aenea* and *Syntomopus ameri- nus*, showed a high degree of natural control in llections of stem borer puparia.

### *Sundry plants.*

(*See also* 2804.)

06. STORY, R.
**Some plants used by the bushmen in obtaining food and water.**
*Bot. Surv. Mem. S. Afr. Dep. Agric.* **30**, 1958, pp. 115, bibl. 30, illus.

ome 62 plants from the Kalahari desert are scribed and illustrated by photographs. The scriptions include notes on the manner in which ey are eaten or used to supply water, cooking ethods and palatability.

07. HOLTTUM, R. E.
**The bamboos of the Malay Peninsula.**
*Gdns' Bull. Singapore*, 1958, **16**: 1-135, bibls, illus.

ne author introduces his subject with a detailed scription of the characters which may be used to cognize and describe bamboos; these include getative characters, the inflorescence, spikelet and ower structure and the ovary and fruit. He then ovides a scheme of classification covering the 7 nera found in Malaya and a general key based on getative characters. Keys are also provided to e species of each genus. The many species found the Peninsula are described individually, and otes are provided on the practical uses to which ch is put.

2708. BOKAREVA, L. I., GOGIBERIDZE, A. A., AND FOGEL', A. N.
**The cultivation of turmeric in the Soviet subtropics.** [Russian.]
*Agrobiologija*, 1958, No. 4, pp. 136-9, illus.

Of the 3 species introduced to Suhumi from India, *Curcuma domestica* and *C. longa* proved suitable for the production of turmeric paper, but not *C. petiolata*, though this last species can be used as a substitute for ginger.

2709. TADMOR, N. H., KOLLER, D., AND RAWITZ, E.
**Experiments in the propagation of *Juncus maritimus* Lam. II. Germination and field trials in the Arava.**
*Ktavim*, 1958, **9**: 177-205, bibl. 34, illus.

This sedge, widespread in Israel, is an important potential source of raw material for the paper industry. Germination was light-obligate and best at high temperatures (26–30° C.). Propagation by seedlings proved more practical than propagation by clumps or by direct-sown seeds, and establishment was best in autumn or early spring plantings. Early plant development was inversely proportional to spacing; brackish irrigation water was not unsuitable. Harvesting during the dormant season prompted renewed growth.

### *Noted.*

2710.

a BORN, M.
Die Schädlingsbekämpfung im Hopfenbau. **(The control of hop pests.)**
*Mitschurin Bew.*, 1958, **7**: 782-4.
Aphids and mites in E. Germany.

b BROWN, P. M., HOWARD, G. A., AND TATCHELL, A. R.
**Chemistry of hop constituents. Part XIII. The hydrogenation of *iso*humulone.**
*J. chem. Soc. Lond.*, 1959, pp. 545-51, bibl. 12.
Part XII was noted in *H.A.*, 28: 2839s.

c BUSCHBECK, E.
Die Pfefferminze—eine volkswirtschaftlich wichtige Kultur. **(Peppermint—a crop of economic importance.)**
*Mitschurin Bew.*, 1958, **7**: 776-80, illus.
In Eastern Germany.

d CHOLNOKY, L., AND OTHERS.
**Carotenoid pigments. III. Pigments of yellow paprika.**
*Acta chim. hung.*, 1958, **16**: 227-46, from abstr. in *J. Sci. Food Agric.*, 1959, **10**: i-169.

e CORBETT, R. E., AND GIBSON, M. G. C.
**Extractives from the New Zealand Myrtaceae. V. The volatile oil of *Leptospermum ericoides*.**
*J. Sci. Food Agric.*, 1959, **10**: 198-200, bibl. 8.

f DARLING, H. S.
**Hop research at Wye College.**
*Agriculture, Lond.*, 1959, **65**: 494-8.
A short review of work in progress.

g FERRI, F.
Avversità climatico-meteoriche della canapa. **(Injuries to hemp due to adverse climatic conditions.)**
*Inf. fitopat.*, 1958, **8**: 234-6, illus.
Types of injury by hail and wind described.

h JAKY, M.
Le ricin en Hongrie. **(Castor beans in Hungary.)**
*Oléagineux*, 1959, **14**: 295-8, illus.
Distribution, varieties, extraction and utilization.

i KŘÍŽ, J.
Hořčík, důležitá, ale opomíjená živina chmele. **(Magnesium, an important, but neglected, nutrient for hops.)**
*Chmelařství*, 1958, **31**: 188-9, illus.
Deficiency symptoms and rôle in hop nutrition.

j LEWIS, K. G.
**Triterpene constituents of the fruits of the osage orange (*Maclura pomifera*).**
*J. chem. Soc. Lond.*, 1959, pp. 73-5, bibl. 8.
Butyrospermol and a new triterpene diol in addition to lupeol.

k MAKSJUTINA, N. P., AND KOLESNIKOV, D. G.
**Furocoumarins in the fruit of *Pastinaca sativa*.** [Russian.]
*Doklady Akad. Nauk. S.S.S.R.*, 1959, **124**: 1335-8, bibl. 12.
Coumarin compounds in the seed.

l OGNYANOV, I., AND IVANOV, D.
**Bulgarian zdravets oil. III. Its terpene compounds.** [Russian summary 8 lines.]
*C.R. Acad. bulg. Sci.*, 1958, **11**: 379-82, bibl. 4.
Identification of terpene fractions comprising 6·8% of the oil of *Geranium macrorrhizum* [for Part II see *H.A.*, 26: 1921].

m ORELLANA, R. G.
***Botrytis* leaf blight of *Ricinus communis* 1.**
*Plant Dis. Reptr*, 1959, **43**: 363-4, bibl. 1, illus.
And the evaluation of resistance to *Botrytis* (*Botryotinia*) *ricini*.

n OSTERBURG, C.
Die Vanille. **(Vanilla.)**
*Gordian*, 1959, **58** (1399): 32-4, (1400): 27-8, illus.
Many aspects of vanilla cultivation discussed.

o PETRLÍK, Z., AND ŠTYS, Z.
První zkušenosti s antibiotiky v ochraně před peronosporou. **(Initial experiments with antibiotics for the protection of hops against downy mildew.)**
*Chmelařství*, 1958, **31**: 166-7, illus.
In artificial infection trials Nystatin at 0·025 to 0·2% promising.

p PETTINATO, F. A.
**A study of *Lomatium suksdorfii* and its volatile oil.**
*Diss. Abstr.*, 1959, **19**: 1573-4, being *L.C. Card No. Mic.* 58-7371 of 97 pp.
Physical and chemical properties of root and fruit extracts.

q POPOFF, A., AND MAŽDRAKOV, P.
*Eruca sativa* Lam. und *Lepidium sativum* L. Anbauversuche und Öluntersuchungen. **(Trials on the cultivation of *Eruca sativa* and *Lepidium sativum* and studies on their oils.)** [Russian summary ¼ p.]
*C.R. Acad. bulg. Sci.*, 1958, **11**: 279-82, bibl. 7.
Seed yields when cultivated rather low, but oils of economic interest.

r ROBINSON, T., AND FOWELL, E.
**A chromatographic analysis for ricinine.**
*Nature*, 1959, **183**: 833-4, bibl. 5.
From castor beans.

s SANDOR, M.
A Hatvani kékmák virágján észlelt rendellenességek. **(Anomalies observed in th flowers of the blue [opium] poppy of Hatvan.** [English and Russian summaries 6 and lines respectively.]
*Növénytermelés*, 1958, **7**: 383-6, bibl. 3, illus

t SVOBODA, G. R.
**Separation and investigation of the mino alkaloidal constituents of *Schoenocaulo officinale*.**
*Diss. Abstr.*, 1958, **19**: 964, being *L.C. Car No. Mic.* 58-5377 of 260 pp.

u VENTURA, M. M.
**Babassu-kernel proteins. IV. An ultra centrifugal examination.)**
*Phyton*, 1958, **11**: 115-16, bibl. 3.
For Part III, see *H.A.*, 29: 1655v.

v ZAJÍČEK, E.
Česat ručně nebo strojem? **(Hand o machine picking hops?)**
*Chmelařství*, 1958, **31**: 171-2, 184-5, illus
Very satisfactory results with the improve Rotobank 1958.

w ZIMMERMAN, J. H.
**A monograph of *Veratrum*.**
*Diss. Abstr.*, 1959, **19**: 1536-7, being *L.C Card No. Mic.* 58-7553 of 322 pp.
Taxonomy of the genus.

# FLORICULTURE.

## *General.*

(*e also* 2093b, 2367d, 2815s, u, 2816i, l, 3072-3075, 3082, 3102.)

11. South Australia.
**Annual Report of the Board of Governors, Botanic Garden, Adelaide, 1957-1958,** 1958, pp. 18, illus.

perimental work has covered the transplanting eucalypts, mulching with crushed almond shells d, in the nursery, methyl bromide fumigation, fting *Dizygotheca* spp., the use of gibberellin on mulas, saintpaulias, cyclamen, adiantum and *wea forsteriana*, and the use of foliar sprays for namentals.

12. Thayer, C. L., and others.
**Department of Floriculture.**
*A.R. Mass. agric. Exp. Stat., 1956-57*, being *Bull.* **503,** 1958, pp. 34-6.

*se nutrition.* From the application of 0·8, 4 and oz. per 100 sq. ft. of $Na_3EDTA$ superimposed on uperphosphate levels before planting it was nd that plant injury occurred at the 20-lb. level chelate. Production records for 3 years in a mmercial greenhouse showed an increase of 1·7 wers per plant when 4 oz. of chelate per 100 sq. ft. e applied as compared with no chelate. *Boron rance.* 1. *Carnations:* Treatment in both high low calcium level soils with fertilizer borate 8% B) at 3½ oz. to 100 gal. water at different quencies produced no ill effects and at the higher quencies reduced the incidence of splitting. 2. *rrhinums:* No visible injury resulted from the e quantity of fertilizer borate applied two weeks r planting and then monthly. *Uramite for sts' crops.* The use of a urea formaldehyde rogen compound proved more successful in both eamed and unsteamed peat–sand–soil mixture a source of nitrogen than ammonium nitrate. was also used successfully with potted geraniums. *l conditioners.* In germination tests using lite and expanded mica under mist and with nd watering mica proved superior. Annuals cked out into moulded pulp marketing con- mers using various mixtures of soil, peat moss, nd and perlite benefited from the presence of lite, whatever the rest of the mixture.

3. Mameli Calvino, G. E.
Relazione dell' attività svolta dalla Stazione Sperimentale di Floricoltura nell'anno 1957.
**(Account of the activities of the Experimental Station for Floriculture [San Remo] during 1957.)**
*Ann. Sper. agrar.*, 1958, **12** (5): Suppl. pp. XXXVII-LXIV.

e San Remo Floricultural Station was expected move to a new site in the spring of 1958. The main activities in 1957 were: carnation breeding; selection of freesias, gladioli and *Nerine* spp.- research on the nutrition of hybrid perpetual; flowering roses and on the minor-element nutrition of carnations, on dates for lifting gladiolus corms, and on the use of plastic to replace glass.

2714. Challenger, S.
**Results from mist propagation systems with comments on their management.**
Reprinted from *N.Z. Plants Gdns*, 1958, **3**: 19-31, bibl. 7.

Two mist propagation systems, one controlled by an electronic leaf and the other by a time clock, have been tested in the greenhouses of Lincoln College, Christchurch. Pumice and a mixture of 50 peat: 50 sand were compared as rooting media. Economics are discussed, and the desirability is stressed of grouping the cuttings according to their speed of rooting, to make the best use of propagating space. Tables show the results obtained with soft and semi-ripe cuttings of 138 species and varieties of ornamental plants, and also group the plants according to the time required from insertion to potting.

2715. Parker, R. D., and Kamp, J. R.
**Effects of hydrogen ion concentration on rooting cuttings of coleus, carnations and chrysanthemums.**
*Ill. St. Flor. Ass. Bull.*, 1958, No. 187, pp. 1-5, illus.

The best rooting of coleus, carnation and chrysanthemum cuttings in gravel was obtained at pH values of 7 and 8. At pH values of 4, 5 and 10 rooting was poor.

2716. Dunham, C. W.
**Use of methylene blue to evaluate rooting of cuttings.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 450-3, bibl. 2.

The colorimeter reading obtained from a solution of methylene blue dye displaced from plant roots was found to be a reliable measure of the amount of roots present on cuttings of both woody and herbaceous species [chrysanthemum, hydrangea, and *Taxus*]. In addition some measure of the adsorbing surface of the roots present was obtained. [Author's summary.]—Univ. Del., Newark.

2717. Box, C. O.
**Study root penetration through new type pot.**
*Miss. Fm Res.*, 1958, **21** (10): 7, illus.

A study was made to determine why roots failed to penetrate through "Jiffy-Pots" made of pressed peat and wood pulp. Results obtained with snapdragons and tomatoes show that penetration may be retarded by the dry outer surface of the pot and also by lack of plant vigour. M.C.S.

2718. Tashiro, H.
**Methyl bromide fumigation against European chafer in nursery stock.**
*J. econ. Ent.*, 1958, **51**: 869-71, bibl. 3.

Eggs, first- and third-instar larvae, pupae, and adults of *Amphimallon majalis*, infesting soil balls of 10-in. diameter, were exposed for 2½ hrs to methyl bromide in an enclosed chamber. Third-instar larvae were completely eliminated with 7, 5, 4, 2, and 2 lb. per 1,000 cu. ft. at 40, 45, 50, 60 and 70° F., respectively. In exposures of other stages to 1 to 4 lb. per 1,000 cu. ft. at 70 to 74° F., complete elimination of first-instar larvae and adults was obtained with the 1-lb. dosage and eggs and pupae with 3 lb.—Ent. Res. Div., U.S.D.A.

2719. Tuttle, E. L., and Tashiro, H.
**Heat treatment for elimination of the European chafer.**
*J. econ. Ent.*, 1958, **51**: 912-13, bibl. 1.

Submerging the roots of plants in water at 112° F. for 70 min., or maintaining a temperature of 130° F. for 30 min. eliminated all stages of the European chafer (*Amphimallon majalis*) infesting nursery stock.—Ent. Res. Div., U.S.D.A.

2720. Henneberry, T. J., Smith, F. F., and Taylor, E. A.
**How thrips get in.**
*Agric. Res. Wash.*, 1959, **7** (7): 14.
**Movement of flower thrips through greenhouse ventilators.**
*J. econ. Ent.*, 1959, **52**: 179, bibl. 2.

As many flower thrips, *Frankliniella tritici*, which damage greenhouse roses, carnations and chrysanthemums, leave the greenhouse *via* the top ventilators as enter by this route. Fewer thrips enter by the side ventilators, but as very few leave by this route it is the side ventilators that need screening. It has also been found that thrips can gain access through evaporator pads used in cooling systems.—Agric. Res. Center, Beltsville, Md.

### *Annual and herbaceous plants.*

(*See also* 2037, 2088, 2376, 2384, 2386, 2793, 2815a, c, f, h, j, l, o, q, w, x, z, 2816c, j.)

2721. Weijer, J.
**Interaction of gibberellic acid and indoleacetic acid in *Impatiens*.**
*Science*, 1959, **129**: 896-7, bibl. 4.

Sprays of 5 ml. of $10^{-4}$ g./1,000 ml. GA applied on alternate days to seedlings, the progeny of a highly inbred strain of "double" *Impatiens balsamina*, caused full development of doubling, early flowering, fruiting and stem elongation. It is suggested that GA met the physiological requirements of the recessive gene for doubling. When applied with IAA in addition, small amounts of IAA increased the elongating effect, but larger concentrations of IAA decreased the response to GA and the elongating effect was nullified. A 3-factor system in th plant, consisting of auxin, an auxin inhibitor and hormone similar to GA is suggested, the concentration of auxin inhibitor depending on the concentration of auxin present. In these experiments GA would appear to have neutralized the auxi inhibitor until the addition of further auxin cause a new and rapid build-up of the inhibitor.—Univ Alberta, Edmonton.

2722. Chan, A. P., and others.
**Mineral nutritional studies on carnatio (*Dianthus caryophyllus*). I. Effects of N P, K, Ca and temperature on flower production.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72** 473-6, bibl. 8.

Increasing N from 20 to 60 p.p.m. increased yiel by 10 flowers per plant, and doubling the N leve again (120 p.p.m.) increased yields by a furthe 9·3 flowers per plant. Yields increased with K u to 90 p.p.m. Increasing P levels showed a gradua increase in flower production, but the response wa not significant. The N×K interaction was signif cant; K effects were most marked at the higher levels, but N effects were significant at each of th 3 K levels tested. At 63° F. (night temperatur yields were significantly higher than at 48° F.– Exp. Farms Serv., Ottawa.

2723. Ebben, M. H.
**Experiments with gibberellic acid on carn tions.**
*A.R. Glasshouse Crops Res. Inst. 1957*, 195 p. 128.

Stock plants of carnations several months old di not respond to 1% gibberellic acid in lanoli applied twice to the base of the stem where sma axillary shoots had begun to appear. On the oth hand, plants 1 month old, each watered with 20 m of a 10 μg./ml. solution of gibberellic acid, showe definite acceleration of shoot growth in the 17 da following treatment, the length increments bei 40–43% greater than in the controls.

2724. Box, C. O.
**Tung hulls tried as soil additives for orn mentals.**
*Miss. Fm Res.*, 1958, **21** (10): 3.

Hulls of tung nuts contain oil, N, P and K. The are processed and marketed as "tung moss" for u as a mulch or soil additive for lawns, vegetables ar ornamentals. Composts containing tung hulls ar "tung moss" were compared with compost co taining peat moss in the production of pot chrysa themums. All plants received equal quantities water and fertilizer. The greater number of bloor and the best growth resulted from the use of pe moss. Plants in the two tung hull compos appeared to be deficient in N. M.C.S.

25. Lunt, O. R., and Kofranek, A. M.
**Nitrogen and potassium nutrition of chrysanthemum.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 487-97, bibl. 4.

tassium requirements of the varieties studied re high. The leaf K content of adequately-tilized plants was from 100 me/100 g. upwards. K-deficient plants K was translocated from the ler to the younger leaves. A level of K in the ler leaves approximately equal to, or greater an, that in the younger leaves seemed to be a nsitive method of determining the adequacy of supply. Necrosis developed when the K content the leaves was about 12–15 me/100 g. At cipient levels of deficiency the shoots of plants re undesirably crooked. At deficient K levels wering was delayed. Colour of the variety ood News was not affected by K level. The trogen requirements of the varieties studied were so high. Leaf N levels of adequately fertilized ants were between 4% and 4·5%. At 2·25% to 75% leaf N plants were considered to be slightly ficient, and at levels below 2% plants were riously deficient. The maintenance of high levels N during the first 7 weeks of growth was very portant. If even moderate N deficiency developed during this period, subsequent N fertilization uld not make good the lost flower quality. stained high N levels in the root zone until wering consistently resulted in "brittle leaf". th adequate N and K levels there were no portant interactions due to variations in N or K vels, which influenced flower quality.—Univ. lif., Los Angeles.

26. Taylor, J. L.
**Effect of frequency of fertilization and lighting period duration on growth and flowering of pot-grown mums.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 425-9, bibl. 10, illus.

y increasing the duration of extra lighting both em length and node number were increased, node umber being directly related to stem length. requency of fertilizer application did not significantly affect stem length or node number. Treatent for 3 weeks with supplemental light after nching produced significantly more flowers than o supplemental light after pinching. More flowers ere produced by 2 and 3 instalments of fertilizer an by a single application. Flower size and eld were increased by extra lighting. Flower size as decreased under no or only 1 week of extra ghting, as the fertilizer applications increased. lower size was increased with 3 weeks' extra ghting by increasing the fertilizer applications om 1 to 3. Flower yield was also increased by creasing the fertilizer applications from 1 to 3. ith a single fertilizer application initial growth was delayed by 7–10 days; the delay in flowering with this treatment was reduced under 3 weeks' extra light.—Fla agric. Exp. Stat., Gainesville.

2727. Doorenbos, J.
Na-effecten van temperatuur en lichtintensiteit op chrysanthemum. (**The after-effects of temperature and light intensity on chrysanthemum.**) [English summary 14 lines.]
*Meded. Dir. Tuinb.*, 1959, **22**: 19-27, bibl. 6, illus.

Plants of 29 chrysanthemum cultivars were topped and grown at constant temperatures of 10°, 15°, 20°, and 25° C. during January. The growth and flowering of plants propagated from the treated plants showed marked after-effects, and in many cases the number of internodes to the terminal inflorescence was greater in plants from cuttings formed at the higher temperatures. In several cases too the internodes were shorter after high temperature treatment. In White Shirley low temperature treatment during formation of the shoots subsequently used as cuttings resulted in delayed flowering.—Lab. TuinbPl., Wageningen.

2728. Lert, P. J.
**Gibberellins on chrysanthemum.**
*Calif. Agric.*, 1959, **13** (4): 4, illus.

Concentrations of gibberellin from 10 p.p.m. to 500 p.p.m. were applied to the growing tips of 2 commercial pompon varieties between the 28th and 56th days of short-day treatment. GA treatments resulted in significantly longer flower stalks and in increased flower spray diameters. Treatments applied before the 28th short day or at concentrations above 500 p.p.m. resulted in extreme lengthening of the plant and in undesirably weak stems. The response to GA was greater in June and July than earlier in the season.

2729. Harada, H., and Nitsch, J. P.
**Flower induction in Japanese chrysanthemums with gibberellic acid.**
*Science*, 1959, **129**: 777-8, bibl. 6, illus.

Gibberellic acid, when applied in lanolin to apices of three Japanese varieties of *Chrysanthemum morifolium*, induced bolting and flowering. These varieties are not sensitive to photoperiod but require a cold treatment in order to flower. On the other hand, the varieties of *Chrysanthemum* which belong to the short-day group are not induced to flower by gibberellic acid. [Authors' abstract.]—Cornell Univ., N.Y.

2730. McFadden, L. A.
**Bacterial blight of chrysanthemum.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 419-25, bibl. 3, illus.

The following treatments are recommended for control of *Erwinia chrysanthemi*: as a supplement to hormone rooting powders, concentrations of 0·5% a.i. of Agri-strep or Agri-mycin 100, or

5–10% a.i. of Agri-mycin 500; as a cutting dip treatment Agri-strep and Agri-mycin 100 both at 0·001% a.i., and Agri-mycin 500 at 0·005–0·01%. Agri-mycin 500 is considered to be safer to use than the other materials, and when basal ends of cuttings were dipped in it for 30 min., concentrations of 0·002–0·005% a.i. gave almost complete blight control without seriously delaying rooting. It is suggested that a rooting hormone should be used with streptomycin to counteract its effect of delaying rooting. There were varietal differences in streptomycin tolerance.—Sub-trop. Exp. Stat., Homestead.

2731. Read, W. H.
**Investigations on the control of chrysanthemum mildew.**
*A.R. Glasshouse Crops Res. Inst. 1957*, 1959, pp. 148-9.

Salicylanilide or thiram, each at 0·8%, or a Karathane preparation at 0·006% active ingredient were applied separately, or mixed with 0·3% petroleum, 4 times in the autumn to chrysanthemums heavily infected with *Oidium chrysanthemi.* Excellent control was achieved with salicylanilide-petroleum and with Karathane-petroleum mixtures, but extended tests on a wide range of varieties and under various conditions are necessary to confirm the non-phytotoxic nature of the treatments.

2732. Woltz, S. S., and Kelsheimer, E. G.
**Effect of variation in nitrogen nutrition of chrysanthemums on attack by serpentine leaf miner.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 404-6, bibl. 1, illus.

Damage to chrysanthemums by the serpentine leaf miner (*Liriomyza pusilla*) was much greater when leaf-N levels were high than when N levels were lower. Plants given a slow-acting N fertilizer in 1 or 2 applications suffered less miner injury at the same leaf N content than plants given weekly liquid fertilizer.—Gulf Coast Exp. Stat., Bradenton.

2733. Kelsheimer, E. G.
**Compatibility of insecticides and fungicides for chrysanthemums.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 392-4, illus.

Single and combined applications of Fermate, Kelthane, dieldrin and parathion applied to 10 varieties of pompon and pot chrysanthemum did not produce any chlorosis or necrosis of leaves or flowers. With all insecticidal applications plant weights were higher than those of untreated plants, but differences were not always significant.—Gulf Coast Exp. Stat., Bradenton.

2734. Overman, A. J.
**Effectiveness of various soil fumigants in commercial production of chrysanthemums.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 394-400, bibl. 10.

Soil fumigation with methyl bromide (2 lb./100 sq. ft.) and Mylone (300 lb./acre) consistently resulted in increases in plant production. Nemagon and ethylene dibromide were more effective when injected to a depth of 6 in. than when drenched on the soil surface. A drench of allyl alcohol applied with Nemagon or EDB was an excellent combined herbicide–fungicide treatment. Vapam as a drench significantly reduced soil pests, but it had only a mild effect when injected into a soil mixture containing German peat.—Gulf Coast Exp. Stat., Bradenton.

2735. Smith, C. R., Jr., Koch, K. F., and Wolff, I. A.
**Evidence for a new oxygenated fatty acid in the seed oil of *Chrysanthemum coronarium.***
*Chem. Ind. Lond.*, 1959, No. 8, pp. 259-60, bibl. 6.

Evidence is presented for the presence of an epoxy fatty acid, that has been named coronaric acid, in the seed oil of *C. coronarium.* The importance of this discovery lies in the fact that synthetically prepared epoxy acids are of industrial importance, and that this is only the second occasion in which they have been found occurring naturally in a plant.—N. reg. Res. Lab., Peoria, Ill.

2736. Yarwood, C. E.
**Tobacco necrosis virus in *Cleome.***
*Plant Dis. Reptr*, 1959, **43**: 390-3, bibl. 16.

Infection of the roots with a strain of tobacco necrosis virus (TNV) has been associated with increased plant height and weight of spider plant (*Cleome spinosa*, variety Pink Queen), bean, cotton and cucumber. No increase in the growth of 7 other species was observed. The drainage water from pots containing TNV-infected *Cleome* contained an abundance of the virus. When the leaves of healthy *Cleome* plants were inoculated with TNV, typical lesions resulted. Plants bearing virus in the roots also contained the virus in the leaves but showed no leaf symptoms. [From author's abstract.]—Univ. Calif., Berkeley.

2737. The Delphinium Society [Great Britain].
***The Delphinium Society's Year Book for 1959.***
Delphinium Society, London, 1959, 8½×5½ in., pp. 136, illus.

In addition to many articles on the progress of the Society in various corners of the world and on how the members grow their plants, there are two of wider importance. In one Edward Steichen describes his half-century of delphinium breeding, concluding by introducing a new race of "bush" delphiniums, the Connecticut Yankees. A. A. Samuelson writes about *Delphinium zalil* (with an excellent colour photograph), a yellow flowered species which has been confused with *D. sulphureum.*

38. (JENKINS, J. M., Jr., AND AYCOCK, R.)
**Commercial production of field larkspurs.**
*Flor. Exch.*, 1959, **132** (2): 14, 43.

nnual larkspur (*Delphinium ajacis*) is grown in e open during winter and spring in south- stern North Carolina. The best time for sowing s 7–20 October, and a seed rate of 1 oz. per 0 ft. of row gave a satisfactory stand. Irrigation ay be necessary before emergence. The plants ould not be thinned, as taller spikes with shorter eral branches are produced when they are owded.—N.C. St. Coll.

39. MÜLLER, B.
Züchtungsziele bei *Gerbera jamesonii*. **(Breeding aims with *Gerbera jamesonii*.)**
*Dtsch. Gartenb.*, 1959, **6**: 72-3, 76, illus.

e author discusses breeding for flower form and lour, stem length and stiffness, lasting quality of t flowers, yield, period of flowering, resistance temperature changes, and wilt resistance.

40. BAYER, E.
Über Anthocyankomplexe, II. Farbstoffe der roten, violetten und blauen Lupinenblüten. **(On anthocyanin complexes. II. Pigments of red, violet and blue lupin flowers.)**
*Chem. Ber.*, 1959, **92**: 1062-71, bibl. 13, illus.

e garden lupins were found to contain a non- lysable anthocyanin complex, with delphinidin coside as the anthocyanin component. Pelar- idin glycosides, which do not form blue metal mplexes in acid media, occurred in red lupins. let flowers proved to contain mixtures of the ue anthocyanin complex and of pelargonidin ycosides. Since pelargonidin glycosides do not m aluminium and iron complexes within the pH nge of the cell sap (4–6), it is understandable that wers that contain only pelargonidin derivatives e not deep blue. [For a note of Part I dealing th the pigments of cornflowers see *H.A.*, 28: 96c.]—Inst. organ. Chem., techn. Hochsch., arlsruhe.

41. OGAWARA, K., AND ONO, K.
**Effects of light on the germination of *Petunia hybrida* seeds.** [Japanese, with English summary ½ p.]
*J. hort. Ass. Japan*, 1958, **27**: 276-81, bibl. 2, illus.

orage of petunia seed at room temperature creased its sensitivity to light, which reached a aximum after 6 months' storage. Light sensitivity as also increased by soaking the seeds before wing for up to 48 hours; a short light treatment 5 min. after 20 hours of imbibition resulted in a gh germination percentage. Red light was more fective than green or blue light in increasing rcentage germination. The responses to red and infra-red light were photoreversible. Germination was also increased by gibberellin, but not by nitrates or thiourea.

2742. KELLEY, J. D., AND HAMNER, C. L.
**The effect of chelating agents and maleic hydrazide on the keeping qualities of snapdragon (*Antirrhinum majus*).**
*Quart. Bull. Mich. agric. Exp. Stat.*, 1958, **41**: 332-43, bibl. 20.

The life of cut flowers of certain snapdragon varieties was prolonged by the chelating agents, Cupferron (ammonium salt of N-nitroso-N-phenyl hydroxylamine), diphenylamine, hexamethylenetetramine, and 1-nitro-2-naphthol-3,6-disulphonic acid, and also by maleic hydrazide. It is suggested that these agents are effective because of their ability to chelate minor elements and so reduce enzyme activity. Cupferron extended the life of cut flowers by 4 to 6 days, and maleic hydrazide by 2 to 4 days.

2743. LINDSTROM, R. S., AND WITTWER, S. H.
**Gibberellin promotes earlier flowering on some flower plants.**
*Mich. Flor.*, 1957, pp. 18-19, from abstr. in *Quart. Bull. Mich. agric. Exp. Stat.*, 1958, **41**: 477-8.

Weekly applications for 10 weeks of 5, 10 or 20 micrograms GA advanced flowering in stocks by up to 5 or 6 weeks depending on variety. One application of 20 or 100 µg. GA applied to the stem apex of annual Canterbury bells (*Campanula*) hastened flowering, and earlier flowering was also obtained with petunia. Both the season of the year and the age of the seedling must be considered before making GA applications. [See also *H.A.*, 28: 667.]

2744. KOHL, H. C., Jr.
**Flower initiation of stocks grown with several temperature regimens.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 481-4, bibl. 4.

The number of days of low temperature required for flower initiation of stocks varied from 85 to 10 days, according to the age of the plant. Flower initiation did not continue if low temperature treatment was stopped before there was visible manifestation of flower initiation. Low temperature treatment, to be effective, must be given immediately before flower initiation. The apical meristem continued to initiate flowers after initiation had started even at warm temperatures. Shoots arising from the centre of double flowers were reproductive on plants brought to flowering at low temperatures, but were vegetative on plants which received a minimum amount of low temperature before the start of flower initiation.—Univ. Calif., Los Angeles.

2745. Kokin, A. Ja., and Členokova, I. V.
**Some methods of hastening flowering in ornamental plants.** [Russian.]
*Uč. Zap. Petrozavodskogo Un-ta*, 1956 (1957), **7** (3): 71-82, from *Ref. Ž.* (*Biol.*), 1958, No. 9, Abstr. 39,562.

When stock (*Matthiola odoratissima*) seeds were treated with Cu, B and Mn, bud formation and flowering were advanced, Cu being the most effective. Vernalization of the seeds of summer chrysanthemums improved earliness and intensity of flowering.

2746. Kohl, H. C., Jr., Lunt, O. R., and Kofranek, A. M.
**Response of *Mathiola incana* to above-normal boron supply.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 485-6, illus.

Plants were injured considerably by 2·5 p.p.m. B in the nutrient solution, and slightly by 0·3 p.p.m. B; at 5 p.p.m. or above flowers became unsaleable. A boron content of 200 p.p.m. or more (on a dry weight basis) in the tissue of a newly-matured leaf probably means that B injury at harvest time will be so severe as to render the crop unsaleable.—Univ. Calif., Los Angeles.

2747. Raabe, R. D., and Wilhelm, S.
***Verticillium* wilt of garden stock (*Matthiola incana*).**
*Phytopathology*, 1958, **48**: 610-13, bibl. 18, illus.

*Verticillium* wilt of garden stock, *Matthiola incana*, has been found prevalent in cut-flower-producing regions of northern and southern California. The symptoms, including a yellowing and wilting of the lower foliage, are very similar to those of potassium deficiency, and in some ways resemble those of *Fusarium* wilt, *Rhizoctonia* foot rot, bacterial blight, and *Phytophthora* foot rot. Inoculations have shown the susceptibility of such common types as the column type, branching type, and ten weeks type, and of the evening scented stock. In 2 inoculation series, the column-type stock was found susceptible to isolates of *Verticillium albo-atrum* from stock, tomato, radish and a nightshade weed [*Solanum sarachoides*]. [Authors' summary.] Factors that should be taken into account in applying control measures are discussed.—Univ. Calif., Berkeley.

### *Bulbs, tubers, etc.*

(*See also* 2092r, 2376, 2384, 2387-2389, 2416a, 2599w, 2815b, h, x, y, 2816f, m.)

2748. Friesdorf/Bad Godesberg.
Einschlagtermin für gekühlte Tulpen und andere Zwiebelgewächse. **(The date for planting out cooled tulips and other bulbs.)**
*TätigkBer. gärtn. Versuchsanst. Friesdorf 1957*, 1958, **29**: 41-2.

Following cold storage tulip, daffodil and hyacinth bulbs must not be exposed to temperatures exceeding 9° C. Dates on which soil temperatures at depths of 10, 20 and 50 cm. dropped to 9° C. in the autumn varied by over a month in different years.

2749. Satarova, N. A.
**Characteristics of dormancy and nuclein metabolism in some flower cultures.** [Russian, with English summary $\frac{1}{3}$ p.]
*Fiziol. Rast.*, 1958, **5**: 417-23, bibl. 48, illus.

[Nuclein is a combination of protein and nucleic acid.—Ed.] The physiological characteristics of dormancy observed in other plants [see *H.A.*, 21: 33-35, 26: 3249, etc.] have now been found in bulbs. In dormant bulbs detachment of the protoplasm and high lipoid content were noted in the cells of the apical meristem and surrounding parenchyma, while the nutrients stored in the scales were complex polymers. These factors increase frost resistance. In tulips and narcissi the sexual organs were already forming in the autumn and differentiation of the ovules and pollen proceeded from then on throughout the winter. At the end of dormancy the greatest concentration of RNA and DNA was found in the meristem, embryo leaves and reproductive organs.—Inst. Pl. Physiol., U.S.S.R. Acad. Sci., Moscow.

2750. Apt, W. J.
**Studies on the *Fusarium* diseases of bulbous ornamental crops.**
*Diss. Abstr.*, 1958, **19**: 416, being *L.C. Card No. Mic.* 58-3031 of 96 pp.

Isolates of *Fusarium oxysporum* f. *gladioli* from crocus, gladiolus and iris (bulbous) were highly pathogenic to their original host and to the other 2 genera. It is recommended that these 3 crops should not be grown in rotation on soils where basal rot fungus is known to be present.—St. Coll. Wash.

2751. Petiet, J.
Anemonen in één jaar van zaad tot bloem. **(Anemones in one year from seed to flower.)**
*Weekbl. BloembollCult.*, 1959, **69**: 520.

Seeds of *Anemone coronaria* Sylphide were sown in mid-January 1957, and the seedlings planted in the open on 1 May at 15×15 cm. Flowering started in mid-June and harvesting continued to the end of October; yields averaged 6 flowers per plant. In 1958 seeds were sown between late February and mid-March, and the young plants went into the open on 6 May at 25×25 cm. Flowers were harvested from early July until mid-October and averaged 8 per plant.—Inst. Vered. Tuinbouwgew., Wageningen.

2752. English, L. L.
**The effect of sprays for cyclamen mite on the production of cyclamen flowers.**
*Ill. St. Flor. Ass. Bull.*, 1958, No. 188, pp. 1-3, bibl. 4.

ne application of endrin did not reduce cyclamen ower production, but 5 applications at monthly tervals finishing in November did reduce flower roduction in 3 varieties. Three applications of ndrin, Kelthane, and Azofume 70 (azobenzene) 3-week intervals beginning in April followed by similar applications beginning in July caused no pparent reduction in the flower crop.

753. Hendrix, J. W., and Hall, H. R.
**The relationship of certain leaf characteristics and flower color to atmospheric fluoride-sensitivity in gladiolus.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 503-10, bibl. 6, illus.

varietal plot of gladioli growing in a fluoride-olluted atmosphere showed a wide range of nsitivity to atmospheric fluorides. In almost all arieties the fourth leaf (numbered from the base f the plant) was more sensitive than the second af. Leaves of the most resistant group of varties were 7·5% longer, 3·5% wider and 22% rger in surface area than leaves of the most nsitive group. The most fluoride-resistant group f varieties had purple flowers, and following in scending order of resistance were groups with vender, red, pink, yellow, white and orange owers. [See also *H.A.*, 28: 705.]—St. Coll. Wash., llman.

754. Forsberg, J. L.
**A summary of 1958 gladiolus disease control tests in Illinois.**
*Ill. St. Flor. Ass. Bull.*, 1959, No. 190, pp. 7-13.

he results of several experiments are summarized. everal soil fungicides proved useful for controlling *clerotinia* rot, but for commercial control higher ates of application than those used in the experinents will be required. Soil fumigants were enerally unsatisfactory. Warm baths for corm eatment were not more effective than cold baths gainst *Fusarium* and *Curvularia* rots, and for ome varieties warm baths were injurious. Hot-water treatment of cormels was more effective for liminating *Fusarium* and *Curvularia* than chemical reatment. Following warm, dry storage conditions, cormels were better able to tolerate hot-water reatment than after cool, moist storage.

755. Magie, R. O.
**A new fungicide for gladiolus corm treatment.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 413-16, illus.

pre-planting dip of a commercial material containing 6% Thimerosal (ethylmercury thiosalicylic cid) was better than treatments with N.I. Ceresan r Dowicide B. Thimerosal treatment at the time f corm cleaning resulted in the greatest flower roduction, but pre-storage treatment favoured orm production. Data from several tests indicate that Thimerosal controls *Fusarium* with less phytotoxicity than N.I. Ceresan or Dowicide B and that it is more effective than captan.—Gulf Coast Exp. Stat., Bradenton. [For earlier work with this fungicide see *H.A.*, 29: 722.]

2756. Magie, R. O.
**Progress in controlling *Botrytis* disease of gladiolus.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 406-10, bibl. 1.

When abundant conidia were present, flower bud infection was not controlled by preventive spraying with zineb or maneb. Antibiotic fungicides applied as sprays or dusts were partly effective against bud infection in some varieties. A captan dip for cut spikes was used successfully to prevent the spread of established infections, until flower infection became too severe. Tests show that flower infection may be controlled by preventing sporulation of the fungus. Recommendations on rates and materials are given.—Gulf Coast Exp. Stat., Bradenton.

2757. Kelsheimer, E. G.
**A comparison of materials used for the control of wireworm and other subterranean pests of gladiolus.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 403-4.

The effectiveness of parathion, malathion, Thimet, Korlan (O,O-dimethyl-0-2,4,5-trichlorophenyl phosphorothioate) and Kepone (decachlorotetracyclodecanone) for wireworm control could not be finally determined owing to abnormally cold weather. Korlan granular applied at 5 lb. a.i. per acre in the row was outstanding with respect to the performance of the Spotlight variety. Thimet at 8% was phytotoxic.—Gulf Coast Exp. Stat., Bradenton.

2758. (Twisk, D.)
Het vervroegen van muscari. (**Forcing grape hyacinths.**)
*Weekbl. BloembollCult.*, 1959, **69**: 598-9.

Results of a series of experiments are summarized on forcing grape hyacinths for cut flowers. These covered (*a*) forcing under heated glass, including varieties, low temperature treatment and treatment of uncooled bulbs; and (*b*) forcing under unheated glass, including suitable varieties and their treatment.—Proefst. Bloemboll., Lisse.

2759. Gould, C. J.
**Zineb shows promise for the control of leaf spot of bulbous iris.**
*Plant Dis. Reptr*, 1959, **43**: 491-3, bibl. 19.

In spraying tests in western Washington in 1958 the most effective control of *Didymellina macrospora* on bulbous iris was obtained with applications of zineb and bordeaux mixture. Sprays of Phaltan, captan, ferbam and Tri-Basic copper sulfate were next in order of merit. [Author's abstract.]—West. Wash. Exp. Stat., Puyallup.

2760. Aycock, R.
**Soil treatments for control of *Sclerotium rolfsii* in Dutch iris.**
*Plant Dis. Reptr*, 1959, **43**: 283-6, bibl. 7.

Row treatments with Terraclor gave adequate control of *Sclerotium rolfsii* [see also *H.A.*, 28: 1785b] but only increased bulb and flower yields in certain seasons. When conditions favoured disease development Terraclor broadcast at 100 lb. per acre gave consistently effective control, and good control was also obtained with PCNB at 75 lb. per acre. Soil fumigation with Vapam at 100 and 150 gal. per acre and with N-521 at 430 and 650 lb. per acre injured the irises. Vapam at 25 and 50 gal. per acre reduced disease incidence but had no significant effect on yields.

2761. Kohl, H. C., Jr.
**Effects of temperature variation on forced *Lilium longiflorum* [var. Ace].**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 477-80, bibl. 5.

The forcing period of Ace Easter lilies was divided into approximate thirds, each of 5 or 6 weeks, and the plants were grown at different temperatures for each third. Results showed that plants which received a low temperature in the first stage initiated fewer leaves. When low temperature was provided during the second stage, height was markedly reduced. The best short, commercial lilies were produced by 60° F. in the first stage, outdoor temperatures averaging 52·3° F. minimum in the second, and 68° F. in the third. [See also *H.A.*, 29: 1712.]—Univ. Calif., Los Angeles.

2762. (Shanks, J. B.)
**Leaf scorch control aided by nutrition.**
*Flor. Exch.*, 1959, **132** (2): 18.

The slow yellowing and drying of the basal leaves of Croft lilies was found to be associated with low N and a deficiency of P. Leaf scorch of the upper and middle leaves was caused by unbalanced nutrition, particularly high N and P and lack of Ca, and was most severe in acid soils. Control of leaf scorch may be obtained by the application of ground limestone to raise the soil pH to about 7 and to supply Ca. For feeding during forcing a 4–1–2 fertilizer is suitable.—Univ. Md, College Park.

2763. Samarodova-Bianki, G. B.
**Microsporogenesis and carotenoids.** [Russian.]
*Fiziol. Rast.*, 1959, **6**: 99-102, bibl. 18, illus.

Carotenoid contents in the anthers of the 24 species investigated rose between bud formation and flowering. The process was studied closely in *Lilium regale* and *L. henryi*. [See also *H.A.*, 27: 18.]

2764. Sobers, E. K.
***Colletotricha* associated with lily bulbs their pathogenicity and host range.**
*Diss. Abstr.*, 1958, **19**: 426, being *L.C. Car* *No. Mic.* 58-2851 of 102 pp.

Infection of lily bulbs by *Colletotrichum lilii* di not affect flowering, plant vigour, bulb development or forcing ability, but bulblet production wa significantly increased.—La St. Univ.

2765. Galil, J.
**Physiological studies on the development o contractile roots of geophytes.**
*Bull. Res. Coun. Israel, Sect. D*, 1958, **6D** 221-36, bibl. 6, illus.

Comprehensive experiments conducted in th gardens of the Biological Institute of Tel-Aviv fro 1948 to 1952 have established that there is onl one factor responsible for stimulating the production of contractile roots by bulbs of *Leopoldi maritima*, namely rapid changes in the ambien soil temperature. H.L.

2766. Leivonen, H.
**The effect of gibberellins and indole-3-aceti acid on the root cells of *Narcissus tazett* (L.).**
*Physiol. Plant.*, 1958, **11**: 838-44, bibl. 11 illus.

Narcissus bulbs with roots 5–10 cm. long wer placed in solutions of gibberellins at concentration of 20–200 p.p.m. for periods of 4 hours to 10 days These treatments did not prevent cell division, affec mitosis or cause changes in chromosomes in th root tips, but they induced division of the differentiated cells of the root. Indole-3-acetic acid (IAA similarly applied for 1–10 days at 5 p.p.m. induce mitosis in all types of cell, except those of th epidermis, but the longer treatments inhibite division of meristematic cells at the root tips. Th cortical cells above the tip were enlarged by IAA but not by gibberellins.—Univ. Helsinki.

2767. Specht, A. W., McClellan, W. D., an Marshall, B. H., Jr.
**Injury to forced narcissus from bulb treatmen by certain mercurials: spectrochemical determination of mineral composition and residua mercury.**
*J. Ass. off. agric. Chem. Wash.*, 1959, **42** 168-73, bibl. 14, illus.

Narcissus bulbs from 4 States were treated wit either New Improved Ceresan, 2% Ceresa Ceresan M or Mersolite 8 at each location an again just before forcing. One lot of bulbs fro each location was left untreated. When the bulb were forced under glass at Beltsville, Marylan flower and foliage injury showed some relationshi to the strength of the mercurial treatments the had received. Analyses for Hg and other element were carried out on the following plant parts base of bulb and roots, (*b*) upper part of bulb, d (*c*) foliage. The content of Hg was highest in ants which had been treated with the strongest solutions. The base of the bulb and roots ntained about twice as much Hg as the upper rt of the bulb. The leaves contained less Hg, but amount present was still appreciable in cases here the foliage showed moderate and severe ury. Treatment with Hg, and particularly with Ceresan, affected the concentrations of Al, Ca, a, Fe, Mn and P in the tissues, but no clear idence was obtained that a disturbed nutrient-ement balance was the cause of flower injury.

68. Aycock, R.

**Relation of fungicidal and nematocidal bulb treatments to phytotoxicity and control of basal rot in narcissus.**

*Phytopathology*, 1959, **49**: 12-16, bibl. 10, illus.

espite discoloration and apparent injury to rcissus bulbs, Dowicide B was equal or superior Mersolite W in controlling *Fusarium* basal rot *oxysporum* f. *narcissi*]. Steeping freshly har- sted bulbs in Dowicide B solutions caused very nspicuous discoloration that would reduce the ue of bulbs where appearance is important. laying treatments 7 days after harvest made m relatively ineffective in disease control; aying treatments 2 weeks after harvest reduced coloration to negligible proportions. The First riety is much more susceptible to basal rot and emical injury than are the Flower Carpet and ng Alfred varieties. [Author's summary.]—N.C. Coll., Raleigh.

769. Andison, H., and Cram, W. T.

**Chemical control of the narcissus bulb fly, *Lampetia equestris* (F.), in British Columbia.**

*Canad. J. Plant Sci.*, 1959, **39**: 56-62, bibl. 17.

he addition of 2, 4 or 10 lb. of heptachlor per 000 gal. to a hot-water/formalin mixture (for matode control) gave 100% control of bulb fly ter soaking for 1½ hours. Cold dips (10 min.) of eldrin or heptachlor (at 3 lb. per 100 gal.), or of drin or chlordane (at 5 lb. per 100 gal.) gave 3–98·5% control of bulb fly for the 3 years during hich the bulbs were in the ground; DDT at 5 lb. er 100 gal. and lindane at 0·5 lb. per 100 gal. were ot effective. Dusts of dieldrin at 3 lb. per acre, of drin or heptachlor at 5 lb., or of chlordane at lb., applied to bulbs in the open furrow, gave 5–99% control for 3 years; lindane at 1 lb. was nsatisfactory. A spray application of dieldrin at lb. per 100 gal. per acre, of aldrin or heptachlor 2 lb., or of chlordane at 5 lb. gave 91–96% ontrol for the 2 years in which they were tested. indane used as a cold dip was the only insecticide at adversely affected bulb growth.—Canada Dep. gric., Victoria, B.C.

2770. Anon.

De vuurbestrijding bij tulpen. **(Control of tulip fire.)**

*Weekbl. BloembollCult.*, 1959, **69**: 614-15.

Experiments have shown that the following materials are effective against tulip fire: carbamates of iron, manganese and zinc alone and in combination, TMTD, captan and dinitrorhodane. Manganese carbamate, applied alone or in combination with other materials, has affected yields more than other compounds [see also *H.A.*, 29: 1691]. Varietal susceptibility to the fungicides must be considered. Three to 5 applications of a low volume spray to the crop are sufficient.—Proefst. Bloemboll. Lisse.

2771. Richter, P.

Der Einsatz der Kartoffelvollerntemaschine E 372 im Tulpenzwiebelanbau unserer Republik. **(The use of the potato harvesting machine E 372 for lifting tulip bulbs in Eastern Germany.)**

*Dtsch. Gartenb.*, 1959, **6**: 50-2, illus.

A potato harvester with certain modifications successfully lifted tulip bulbs in preliminary tests. The working width of the machine is 125 cm., thus 3 rows of bulbs spaced 41·7 cm. apart could be lifted each time. Mechanical damage to the bulbs was fairly low (6–8%) and mostly occurred in the centre row; an improvement to reduce the damage is suggested.

### *Lawns and sports turf.*

(*See also* 2368, 2402, 2403, 2816a, d, 3082.)

2772. Weibull, G.

**Experiments with turf.**

*Agri hort. genet.*, 1958, **16**: 209-20.

Five trials are described in which various lawn grass species were compared alone and in mixtures, three trials being situated at Weibullsholm Plant Breeding Institute in Landskrona on the south-west coast of Sweden, and one each at Gothenburg and Båstad. The results, based on a system of points awarded for colour, density and freedom from disease, indicate that, in general, a mixture of 50% *Festuca rubra*, 30% *Poa pratensis* and 20% *Agrostis tenuis* will provide a turf of good quality. Under some conditions, e.g. a moist soil, *Poa trivialis* may serve as a substitute for *P. pratensis*. Species which were too aggressive included *Lolium perenne*, *L. multiflorum* and *Festuca pratensis* and, to a somewhat less marked extent, *Phleum pratense*, *Agrostis gigantea* and *Cynosurus cristatus*. Species showing promise included *Phleum nodosum*, *Agrostis stolonifera* and *A. canina*.

2773. Sumner, D. C., Goss, J. R., and Houston, B. R.

**Merion bluegrass seed production.**

*Circ. Calif. agric. Ext. Serv.* **470**, 1958, pp. 27, illus.

Merion Kentucky Bluegrass is a cool weather plant doing well at altitudes of 1,000 to 4,000 ft. in California, where it is useful for golf courses. Here an account is given of its cultivation for seed production. Particular attention is paid to methods of harvesting, drying and threshing, and the machinery and labour force needed to handle areas ranging from 25 to 400 acres are set out in detail.

2774. Britton, M. P.
**The identity, epiphytology and control of stem rust of Merion bluegrass.**
*Diss. Abstr.*, 1959, **19**: 1528-9, being *L.C. Card No. Mic.* 58-3140.

Acti-dione RZ, zineb, maneb, dichlone, morpholine sulphanilate and toxaphene gave at least 95% control of stem rust (*Puccinia graminis*) when applied 48 hours before inoculation in the greenhouse. Acti-dione RZ gave adequate rust control when applied 48 hours after inoculation in the greenhouse. On Merion bluegrass lawns Acti-dione RZ and morpholine sulphanilate were the best materials, although control by maneb and zineb was adequate. The superiority of Acti-dione RZ was partly due to its phytotoxicity on heavily rusted leaves. The replacement of such leaves was enhanced by light applications of N and adequate watering.—Purdue Univ.

2775. Burton, M., and Hutchins, R. E.
**Insect damage of lawns checked.**
*Miss. Fm Res.*, 1958, **21** (11): 1, 7.

In trials on lawns of St. Augustine grass attacked by the chinch bug (*Blissus leucopterus insularis*) phosphorus insecticides proved the most effective, because the insect built up resistance to BHC and dieldrin. Diazinon 25% e.c., used alone at ½ to 1 oz. per 100 sq. ft. or mixed with chlorinated hydrocarbon insecticides such as BHC, is recommended. M.C.S.

2776. Kerr, S. H.
**Tests on chinch bugs, and the current status of controls.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 400-3, bibl. 3.

It was apparent in tests that DDT is ineffective for chinch bug control on St. Augustine grass lawns around Miami. Control by parathion and V-C 13 was good; it was necessary to apply Diazinon twice with an interval of 1½ to 2 weeks for satisfactory results. Promising materials which need further testing are Trithion, Dibrom and Korlan. Biological control by fungi was unsuccessful.—Fla agric. Exp. Stat., Gainesville.

2777. Perry, V. G.
**Anatomy, taxonomy, and control of certain spiral nematodes attacking blue grass in Wisconsin.**
*Diss. Abstr.*, 1959, **19**: 1509, being *L.C. Card No. Mic.* 58-7524 of 71 pp.

Excellent control of *Helicotylenchus* spp. in Kentucky blue grass turf was obtained with dibromochloropropane and by dichlorophenyl diethyl phosphorothioate. Grass growth was improved after the application of these materials as water emulsions in April.—Univ. Wis.

2778. Lautz, W.
**Chemical control of nematodes parasitic on turf and sweet corn.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 38-40, bibl. 1.

In plots on a golf fairway Nemagon at 8 gal. active ingredient per acre and PRD at 40 and 20 lb. a.i. per acre reduced nematode populations to well below those of the control plots for 4 months, but differences 6 months after treatment were of no practical significance.—U.S.D.A., Sanford.

2779. Nutter, G. C., and Christie, J. R.
**Nematode investigations on putting green turf.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 445-9, bibl. 8, illus.

Populations of 4 nematode species showed an average increase of 200% between August 1957 and August 1958, in spite of treatment with V-C 13 earlier in the summer. Population increases of sting (*Belonolaimus longicaudatus*), ring (*Criconemoides* spp.) and lance (*Hoplolaimus tylenchiformis*) nematodes were smaller on plots receiving activated sludge (98%) than on plots receiving ammonium nitrate (261%) or urea-form (241%). Turf quality was highest on activated sludge plots. In 1958 Nemagon at 5 gal./acre gave outstanding reductions in nematode populations 8 weeks after treatment; control of *Trichodorus* sp., however, was less satisfactory. Turf quality on Nemagon-treated plots was improved by 44% on the ammonium nitrate and urea-form plots, but only by 12% on activated sludge plots. Close mowing, soil aeration, high gallonage application and an immediate water seal are recommended as essential techniques for successful nematode control in turf.—Fla agric. Exp. Stat., Gainesville.

### *Orchids.*

*See* 2390.

### *Foliage and succulent plants.*

(*See also* 2806, 2815e, g, t, 2816e, 3080.)

2780. Taylor, J. L., Joiner, J. N., and Dickey, R. D.
**Preliminary report on the nitrogen–light intensity requirements of some commercially grown foliage plants.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 434-8, bibl. 7.

The stem diameters of *Philodendron oxycardium* and *P. micans* were significantly increased by increasing the light intensity from 90% shade to

30–60% shade. Leaf area, colour, stem length and iode numbers were not affected by increased light ntensity. The percent rooting, percent bud break ind rooting quality of the *Philodendron* species and of *Scindapsus aureus* were not affected by N/light ntensity treatment of the stock plants. Subsequent rowth of *Philodendron* plants showed no effect of tock plant treatments, but stem diameter was ignificantly reduced as the light intensity applied o the stock plants was increased. There was no esponse to N in these experiments.—Fla agric. Exp. Stat., Gainesville.

781. MILLER, H. N.
**Control of *Pythium* root rot of Chinese evergreen by soil fumigation.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 416-19, bibl. 2, illus.

n the nursery and greenhouse Vapam, Mylone and nethyl bromide were all effective in controlling *ythium splendens* when applied 3 weeks before lanting *Aglaonema simplex*. Vapam and Mylone nay be applied as soil drenches, which gives them n advantage over methyl bromide.—Fla agric. xp. Stat., Gainesville.

782. MAY, C., AND PALMER, J. G.
**Experiments with captan and ferbam as systemics for control of bacterial rot of saguaro and organ-pipe cactus.**
*Plant Dis. Reptr*, 1959, **43**: 496-7, bibl. 1.

rbam was not absorbed from soil or translocated om an injection wound by the organ-pipe cactus, *achycereus marginatus*, and captan did not prevent e development of soft rot, *Erwinia carnegieana*, inoculated plants of saguaro, *Carnegiea gigantea*. -U.S.D.A., Beltsville, Md.

783. LEGOWSKI, T. J.
**Keeping mealy bugs off succulents.**
*Grower*, 1959, **51**: 797.

Malathion, applied at 1½ pints of 50% concentrate er 100 gal. plus a succinate wetter, was the best f several insecticides tested for mealybug control. reated plants included *Opuntia*, *Echinopsis*, *rassula* and *Acrinium*.—N.A.A.S., Cambridge.

### *Roses.*

(*See also* 2037, 2712, 2713, 2803.)

784. NATIONAL ROSE SOCIETY OF GREAT BRITAIN.
***The rose annual, 1959.***
National Rose Society, London, 1959, 8×5 in., pp. 206, illus.

he outstanding event for British rosarians in 1958 as the International Rose Conference held in ondon, and several of the lectures delivered to the onference are reported in this *Annual*. W. Kordes lked of his work in "Breeding for hardiness". In search of new roses" was discussed by S. IcGredy, while E. S. Boerner spoke on "The future of the rose". The cultural side of rose-growing was discussed in papers by S. Heatley on "Foliar feeding", by E. F. Allen on "Compost for roses", by B. M. Dougall on "The chemistry of the rose garden", by G. Thomas on "Shrub roses", and by W. J. W. Sanday on "Practical rose growing"; Australian methods of rose growing were also described by A. S. Thomas in "Roses in the sunny south". In the rest of the *Annual* other problems of rose growing and breeding are discussed, and five experts choose the best of some recent rose introductions. The colour photographs are again of a high standard.

2785. (WEINSTEIN, L. H.)
**High quality rose production.**
*Flor. Exch.*, 1959, **132** (2): 15-16.

Investigations at the Boyce Thomson Institute have produced the following, among other, results: *Powdery mildew control* was obtained by 5 p.p.m. of P-189 (anisomycin) plus 0·3 p.p.m. of cycloheximide used with a wetting agent. *Cut roses were preserved* with the aid of a water-soluble formulation of dextrose sugar, maleic hydrazide, aluminium sulphate, citric acid, and a bactericidal-fungicidal agent; flower colour was maintained throughout the extended storage period. *Pigment studies* showed that cyanidin, which is present in the "normal" red rose, tends to turn blue; in brick-red roses, however, cyanidin is present with pelargonidin, which, even in combination with sugars, is resistant to blueing. Studies on the *biochemistry of senescence* showed that quinic acid supplied to Better Times roses was converted to shikimic acid [see also *H.A.*, 29: 1775n].

2786. LEWIS, W. H.
**A monograph of the genus *Rosa* in North America. I. *R. acicularis.***
*Brittonia*, 1959, **11**: 1-24, bibl. 20, illus.

This rose species has been subdivided into the subspecies *acicularis* in Eurasia and *sayi* in North America. The first record of a heptaploid rose is that of an artificial hybrid between these subspecies, with the chromosome number 2n=49. Normally the *sayi* form is hexaploid and the Eurasian form octoploid. The 9 morphological characters used to distinguish individuals are mentioned.

2787. SMITH, A. W., AND WALLIS, L. W.
**Commercial practice in rose-growing nurseries in the East Midlands region.**
*N.A.A.S. quart. Rev.*, 1959, **10**: 132-8.

Soil and relative freedom from pests and diseases have favoured the development of many rose nurseries in Nottinghamshire and Leicestershire. The authors present a time-table of cultural operations over the 2 years needed to produce a saleable plant, and describe the rootstocks used, soil preparation, planting, propagation, post-budding operations, and lifting and packing. New developments are touched on briefly.

2788. Puccini, G.
**Ricerche sulla nutrizione della rosa ibrida rifiorente. (Studies on the nutrition of hybrid tea roses.)** [English summary 1 p.]
*Ann. Sper. agrar.*, 1958, **12**: 1655-76.

The main aim of rose cultivation in the open on the Italian Riviera is the production of flowers in winter. Marketable production generally starts in the third, rarely in the second, year after planting. These investigations by the San Remo Horticultural Research Station concerned Glory of Rome roses grafted on rooted cuttings of *Rosa indica major*. The following conclusions based on chemical analysis were reached: During the first year after transplanting there is little absorption of nutrients or formation of organic material. In the second year vigorous growth is made and nutrient absorption and formation of organic matter is considerable. The increase is maintained into the 5th year. During these 5 years the N: $P_2O_5$: $K_2O$ ratio in the plants is approximately 1 : 0·25 : 0·60. Copper, manganese, molybdenum, cobalt, zinc, boron and titanium were also found, but no trace of lithium, barium, vanadium, beryllium or zirconium. The soil on the other hand contained copper, molybdenum, zinc, boron and titanium in ascertainable amounts and also traces of cobalt, but no lithium or barium. Attention is drawn to the presence of appreciable amounts of cobalt in the plants but only traces in the soil, which shows the selective power of the plants for that element. In addition appreciable amounts of magnesium were found to be absorbed from the soil.

2789. Kamp, J. R., and Pokorny, F. A.
**The effect of spacing on the nutrient requirements of roses in a high boron soil.**
*Ill. St. Flor. Ass. Bull.*, 1958, No. 188, pp. 10-12, and 1959, No. 189, pp. 7-8, bibl. 1.

During 3 years' production from Better Times roses (spaced at 1·17 sq. ft. per plant) increases in soil N levels up to 80 p.p.m. nitrate were accompanied by increases in the total production of saleable flowers. The greatest benefit was obtained from the first increment (raising soil nitrate from 20 to 40 p.p.m.). Increases in N levels had no effect on the distribution of long, medium and short stemmed flowers within total production. The longest average stem lengths were obtained at the highest N level (80 p.p.m.) and at the intermediate of three K levels (16 p.p.m.). [See also *H.A.*, 29: 1735.]

2790. Kamp, J. R.
**Does cooling roses pay?**
*Ill. St. Flor. Ass. Bull.*, 1958, No. 187, pp. 10-11.

During a 2-year study 5,292 more saleable Better Times roses were produced from an uncooled house than from a cooled house. There were 1,296 plants in each house, and the numbers of saleable flowers produced over the 2 years were 95,204 and 89,912, respectively.

2791. (Mahlstede, J. P.)
**Gibberellic acid tested on flowers.**
*Ia Fm Sci.*, 1958, **13** (6): 16-17, illus.

Growth responses of hybrid tea roses and *Caryopteris* Blue Mist to 0·005% GA varied, but, in general, internode length (between both leaves and flowers) was increased in both plants. Flowers on the same stalk or in the same cluster also tended to open at the same time rather than progressively. Erratic results were obtained when GA was used in propagation.

2792. Palmer, J. G., Henneberry, T. J., and Taylor, E. A.
**Sprays for control of powdery mildew of roses.**
*Plant Dis. Reptr*, 1959, **43**: 494-5.

Among fungicides applied against powdery mildew, *Sphaerotheca pannosa*, on roses Phaltan at 2 lb./10 gal. was the best, followed by thiram plus each of 4 other materials and Karathane either alone or combined with Acti-dione PM. None of the formulations used, however, gave really good control.—U.S.D.A., Beltsville, Md.

2793. Nelson, P. E., and Wilhelm, S.
**Thermal death range of *Verticillium albo-atrum*.**
*Phytopathology*, 1958, **48**: 613-16, bibl. 14 illus.

Minimum exposure and lethal temperature in ho water for a rose and a tomato isolate of *Verticillium albo-atrum* growing on previously sterilized uniform pieces of flower stalks of *Plantago lanceolata* wa 5 min. at 47° C. for hyphae and conidia, and 10 min at 50° C. for microsclerotia. A 40-min. exposure a 47° C. also killed microsclerotia. Rose and pelargonium cuttings known to be infected with *V. albo-atrum* failed to root after treatment in ho water at several temperatures lethal to *V. albo-atrum*. [From authors' summary.]—Univ. Calif. Berkeley.

2794. McFadden, S. E., and Kerr, S. H.
**Effects of soil mixtures and nematicida drenches on production of Happiness rose.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71** 441-5, bibl. 20.

Soil drenches of both V-C 13 and Nemagon wer safely used for nematode control around established rose plants growing on manetti stocks. Both treatments increased the production of saleabl flowers by about 20%.—Fla agric. Exp. Stat. Gainesville.

795. English, L. L.
**What about Tedion?**
**Directions for using Tedion on steam pipes for control of the two-spotted mite in greenhouses.**
*Ill. St. Flor. Ass. Bull.*, 1959, No. 189, pp. 6-7, and No. 191, pp. 8-9.

slurry of Tedion wettable powder (1 lb. powder 200,000 cu. ft. of greenhouse) was applied in anuary to the steam pipes of a commercial rose reenhouse, which caused it to act as a fumigant. ix applications at intervals of 3–4 days brought he existing mite infestations under complete conol, and treatments were then repeated at weekly tervals. Tedion may cause leaf drop on the rose ariety White Butterfly.

he second paper describes the method of applying edion and discusses its limitations, compatibility nd phytotoxicity.

### *Other trees and shrubs.*

See *also* 2037, 2082, 2147, 2261, 2385, 2791, 2815d, h, i, k, m, n, p, r, v, 2816b, g, m.)

796. Morrison, W. C.
**Woody honey plants for roadside planting in New Jersey.**
*Circ. N.J. Dep. Agric.* **403**, 1957, pp. 23, from abstr. in *Bee World*, 1959, **40**: 50.

hrubs and trees of special value for soil and water nservation, and which also provide nectar or llen for bees, are suggested for roadside plantgs. Growth habits, relationship to shade, soil eferences and methods of propagation are scussed.

797. Browicz, K., and Bugała, W.
Rzadkie drzewa i krzewy w Arboretum Kórnickim. (**Rare trees and shrubs in the Kornik Arboretum.**) [English and Russian summaries 1 p. each.]
*Arbor. Kórnickie, 1957-58*, 1958, **3**: 49-69, bibl. 13, illus.

otes are provided on *Pinus armandi*, *Albizzia librissin*, *Shepherdia canadensis*, *S. argentea*, *ndera benzoin* and *Grewia parviflora*, with special ference to their frost resistance.

798. Enright, L. J.
**Rooting large evergreen cuttings.**
*Amer. Nurserym.*, 1959, **109** (2): 15, 56-7, illus.

uttings were prepared during April from 2- and -year-old wood of several ornamental plants *ucuba japonica*, *Ilex* spp., *Juniperus* spp. and *smanthus ilicifolius*), dipped in Hormodin 3 and serted in sand under intermittent mist. Large ttings produced more roots than did cuttings of ormal commercial size, except in *Osmanthus*, hich produced similar amounts of roots from large and small cuttings.—Univ. Md, College Park.

2799. Ryan, G. F., Frolich, E. F., and Kinsella, T. P.
**Some factors influencing rooting of grafted cuttings.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 454-61, bibl. 10.

The rooting of grafted cuttings of varieties of citrus, avocado, camellia, hibiscus and macadamia, which were either difficult or easy to root, was influenced by the stem from which the roots originated, and not by the kind of leaves supplying the cutting. In other words, so long as the leaves remained healthy, the rooting capacity of the scion did not influence the rooting behaviour of the stock.—Univ. Calif., Los Angeles.

2800. Dickey, R. D.
**Effect of quantity of roots on subsequent growth of cuttings.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 439-41, bibl. 1, illus.

The degree of rooting did not influence the subsequent growth of *Viburnum suspensum* and *Thryallis glauca*, but did significantly affect the growth of *Podocarpus macrophylla maki*. With each increase in the degree of rooting of *Podocarpus* cuttings, larger plants were obtained from them.—Fla agric. Exp. Stat., Gainesville.

2801. (Whang, A., and Watson, D. P.)
**Effect of humidity on evergreen growth.**
*Flor. Exch.*, 1959, **132** (2): 19.

Cuttings of *Taxus cuspidata capitata* and *andersoni*, *T. media hicksi*, and *Juniperus chinensis* and seedlings of *Pinus nigra* were grown at average temperatures of 74° to 78° F. at both low (34·4%) and high (91·9%) relative humidities. Leaves were thicker on plants grown at high humidity, but only *T. cuspidata* and *J. chinensis* showed increased growth. [See also *H.A.*, 29: 691.]—Mich. St. Univ., E. Lansing.

2802. Cannon, T. F.
**Foliar analysis as an index to the fertilizer requirement of some ornamental trees.**
*Diss. Abstr.*, 1958, **19**: 623-4, being *L.C. Card No. Mic.* 58-2624 of 191 pp.

Mid-shoot leaf samples collected from *Crataegus phaenopyrum*, *Quercus palustris* and *Gleditschia triacanthos inermis* between June and September showed no significant seasonal changes in contents of P, K, Mg, Fe and Mn, but there were significant changes in N and Ca. In greenhouse plants of *G. triacanthos inermis*, supplied with different amounts of N and K, total leaf N and Ca increased and total P, K, Mn and Fe decreased as the amount of N supplied was increased. With increases in the amount of K supplied the leaf K content increased and leaf Ca and Mg decreased. The optimum N concentration was 80 p.p.m. and the optimum K concentration 30 p.p.m.—Ohio St. Univ.

2803. Frese, P. F. (Editor).
**Pruning handbook.**
*Plants and Gdns*, 1958, **14**: 178-257, illus.

The ground covered in this edition is wide. In it are described methods and effects of pruning ornamental trees and shrubs, including evergreens, roses, fruits, camellias, hollies, and tender plants. The choice and training of hedges, including boxwood and topiary, are also discussed. As is usual in this series the illustrations are many and good.

2804. Richardson, S. D.
**Bud dormancy and root development in *Acer saccharinum*.**
*Commun. Lab. Plant physiol. Res. Wageningen* **159**, reprinted from symposium *The Physiology of Forest Trees*, 1958, pp. 409-25, bibl. 40.

Observations on first-year seedlings of *Acer saccharinum* growing in a constant environment (temp. 20° C., light intensity 5,000 lux) in the laboratory and under natural conditions in the garden showed that between autumnal leaf fall and bud break in spring, root growth takes place only after exposure to low shoot temperatures. A close correlation was established between the initiation of root growth in spring and the presence of at least one physiologically non-dormant bud. Removal of non-dormant buds at this stage suppressed root development entirely. The necessity for distinguishing between true physiological dormancy and dormancy imposed by the external environment was emphasized by the finding that a shoot temperature of 5° C. inhibited bud expansion but did not prevent the export of growth factors to the roots. To investigate the temperature relations of dormancy, dormant seedlings were exposed to temperatures from 2° to 27° C. It was found that the temperature requirement for the completion of physiological dormancy is equivalent to 2 months at 5° C. After this period root growth is possible at root temperatures above 5° C.; bud expansion does not ensue, however, until seedlings have been at a shoot temperature of at least 10° C. for about 20 days. [From author's summary.]

2805. (Widmoyer, F. B.)
**Reduction of winter injury of evergreens.**
*Flor. Exch.*, 1959, **132** (2): 16.

Leaf dehydration of arborvitae may occur in winter when relatively high temperatures around the leaves cause evaporation, while soil temperatures are still too low to allow the uptake of replacement water. Some control of this desiccation may be obtained if the plants receive adequate water in the autumn before the soil freezes. Antidesiccant sprays applied in the autumn whe temperatures are 60° F. or above may also hel Water may be sprayed on the plants in the earl spring when the ground is frozen but air tempera tures reach 40–60° F. Windbreaks will also reduc evaporation.—Mich. St. Univ., E. Lansing.

2806. Wagner, A.
Ein Kniff bei der Kultur von *Ficus*-Blat stecklingen. **(A method of raising lea cuttings of *Ficus*.)**
*Gartenwelt*, 1959, **59**: 99-100, illus.

*Ficus* plants raised from leaf-cuttings are le shapely than those grown from tip-cutting However, the habit of plants raised from lea cuttings may be improved by forcing shoot grow from rooted cuttings, removing the leaf from whi the cutting was produced, bending the young sho through an angle of 180° and planting deeply that the lowest leaf of the young shoot lies on t soil surface.

2807. Dickey, R. D.
**Hibiscus in Florida.**
*Bull. Fla agric. Ext. Serv.* **168,** 1958, pp. 3

The author devotes nearly the whole bulletin to consideration of the Chinese hibiscus (*Hibisc rosa sinensis*), its varieties, its place in the garde propagation (by air layering, budding and gra ing), soils and climate, time of planting and gene cultivation practice in Florida. Finally he brie discusses the following other species: *Hibisc schizopetalus*, *H. mutabilis*, *H. syriacus*, *H. tiliace* and *H. palustris* (*H. moscheutos*).

2808. Kamp, J. R., and Van Drunen, E.
**Spring cuttings of Pfitzer juniper.**
*Ill. St. Flor. Ass. Bull.*, 1959, No. 192, p.

Rooting of cuttings taken in the spring was poo than that of autumn-struck cuttings, but rooti was improved by short-day treatment. Treatme with Chloromone significantly improved rootin

2809. Enright, L. J.
***Magnolia grandiflora* from cuttings.**
*Nat. hort. Mag.*, 1959, **38**: 53-4, illus.

Cuttings of *Magnolia grandiflora* were taken June and were made about 6 in. long from termi portions of the current season's growth, with slanting cut ¼ in. below a node. The lower inch the stem was slit on 2 sides, and the cuttings we treated with hormones (a 10-second dip of 2% I gave the best results) before they were set un intermittent mist. Cuttings taken at wee intervals during June showed 82–88% rooti after 44–47 days.—Univ. Md, College Park.

2810. Eufinger, B.
Erfahrungen mit *Euphorbia pulcherri* **(Experience with poinsettia.)**
*Gartenwelt*, 1959, **59**: 26-7, illus.

Supplementary lighting (3·5 to 4W per sq.

en during October delayed flowering by twice many days as the treatment lasted. Poor light ensity also delayed flowering and caused flower ormalities. All varieties may be grown at 15° 18° C. without injury, but the growth of late ieties was delayed, particularly when light ensity was poor. Plants grown at temperatures ow 18° C. showed better flower colour than se grown at higher temperatures.

1. KAMP, J. R.
**Wounding effects on *Prunus cistena* cuttings.**
*Ill. St. Flor. Ass. Bull.*, 1958, No. 188, pp. 8-10.
oting of 2 batches of *P. cistena* cuttings taken in ne was 97% and 100% when Chloromone was d, whether or not the cuttings were wounded. unding untreated cuttings taken in late July failed to improve rooting, except where a ting powder or Geigy 416 was used.

2. MCARTHUR, G. W. F. M.
***Cercospora* leaf spot on rhododendron (*Cercospora handelii* Bubak).**
*N.Z. J. agric. Res.*, 1959, **2**: 86-9, bibl. 5, illus.
s disease of rhododendron, not previously rded in New Zealand, appeared in 1957. cted leaves should be removed and burned, bordeaux 6: 8: 100 applied at 14-day intervals. nyl mercury chloride (wettable powder) at 2 lb. 100 gal. was effective but phytotoxic.—Hort. ., Dep. Agric., Wellington. M.C.S.

3. STAHN, B.
Eine erfolgreiche Bekämpfung der Azaleenmilbe. **(The successful control of the azalea mite.)**
*Dtsch. Gartenb.*, 1959, **6**: 19-20.
nite, as yet unidentified, and the serious damage causes are described. Good control of the pest s obtained with 0·8% Antimil. Three other prietary acaricides gave little or no control.

4. DOWNS, R. J., AND PIRINGER, A. A., Jr.
**Growth and flowering responses of five *Viburnum* species to various photoperiods.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 511-13, bibl. 4.
e *Viburnum* species showed increased vegetative wth in long-day conditions, compared with wth in 8-hour days. Photoperiod did not appear control flower initiation. In a field trial with species the length of the previous photoperiod no effect on subsequent bud formation or on umn colour or survival after exposure to a nimum temperature of 9° F. Wind damage was st extensive on plants grown in 16-hour days, ause their stems were the longest. [See also *H.A.*, 3995.]—U.S.D.A., Beltsville, Md.

*Noted.*

2815.

a ANON.
**Are you growing dwarf asters as pot plants?**
*Ill. St. Flor. Ass. Bull.*, 1959, No. 192, p. 5 illus.
A note on suitable varieties and culture.

b ASEN, S., AND OTHERS.
**Isolation of α-aminoisobutyric acid from bulbs of *Iris tingitana* var. Wedgewood.**
*J. biol. Chem.*, 1959, **234**: 343-6, bibl. 14.
Occurrence in a plant established for first time.

c BALI, P. N., AND TANDON, S. L.
**Preliminary study of colchicine induced tetraploids of *Iberis umbellata* L.**
*Sci. and Cult.*, 1959, **24**: 428-9, bibl. 6.
Leaf anatomy, flower behaviour and cytology.

d BUGAŁA, W., AND CHYLARECKI, H.
Szkody mrozowe wśród drzew i krzewów Arboretum Kórnickiego wyrządzone w czasie zimy 1955/56 r. **(Frost damage to trees and shrubs in the Kornik Arboretum in the winter of 1955/56.)** [English and Russian summaries 1¼ pp. each.]
*Arbor. Kórnickie, 1957-58*, 1958, **3**: 111-77, bibl. 25, illus.
Behaviour of many woody ornamentals recorded.

e CHIANG, T. I.
**Marketing Florida *Asparagus plumosus* ferns.**
*Diss. Abstr.*, 1959, **19**: 1879-80, being *L.C. Card No. Mic.* 58-3484 of 192 pp.
Improvements in the marketing system, which are described, might increase demand.

f CLOSE, R.
**Antirrhinum rust in New Zealand.**
*N.Z. J. Agric.*, 1958, **97**: 551-2, bibl. 1, illus.
Control, and trials with rust-resistant varieties.

g DEWERTH, A. F.
**A selected list of exotic plants and their adaptability to building interiors.**
*Ill. St. Flor. Ass. Bull.*, 1959, No. 189, pp. 3-5, illus.
Light and soil moisture requirements and decorative use.

h FORSBERG, J. L.
**Diseases of azalea and rhododendron.**
**Diseases of calla lily.**
**Carnation diseases.**
**Stock [*Matthiola incana*] diseases.**
**Cyclamen diseases.**
**Cineraria diseases.**

*Ill. St. Flor. Ass. Bull.*, 1958, No. 179, pp. 4-6, bibl. 13, illus.; No. 184, pp. 7-9, bibl. 9, illus.; No. 187, pp. 11-16, illus. and No. 188, pp. 5-8, bibl. 37, illus.; 1959, No. 189, pp. 8-11, bibl. 12, illus.; No. 191, pp. 9-10, bibl. 4, illus.; No. 192, pp. 4-5, bibl. 1, illus.
Useful notes on symptoms and control.

i Graafland, W.
*Exobasidium japonicum* op azalea. (***Exobasidium japonicum* on azalea.**) [English summary ⅓ p.]
Reprinted from *Meded. LandbHogesch. Gent*, 1957, **22**: 547-51, bibl. 7, [received 1959].
Information on mode of infection and timing of protective measures.

j Hardy, J.
**Economic cultivation of early flowering chrysanthemums.**
*J. Inst. Corn agric. Merchants*, 1959, **7** (1): 56-8.
Varieties and propagation.

k Harris, B. J., and Baker, H. G.
**Pollination in *Kigelia africana* Benth.**
*J. W. Afr. Sci. Ass.*, 1958, **4** (1): 25-30, bibl. 12, illus.
Probably by fruit-eating bats and possibly by hawk-moths.

l Heath-Coleman, W.
**A cheap way of treating chrysanthemums.**
*Grower*, 1959, **51**: 619-21.
Hot-water treatment within the small grower's means.

m Heimann, M.
Ist das Problem des "Erica Sterbens" endgültig geklärt? (**Is the problem of "erica death" finally solved?**
*Gartenwelt*, 1959, **59**: 23-5, bibl. 10, illus.
A review discussing susceptibility and control [see also *H.A.*, 28: 7381.

n Hodgdon, A. R., and Steele, F. L.
**The woody plants of New Hampshire.**
*Stat. Bull. N.H. agric. Exp. Stat.* **447**, 1958, pp. 60, bibl. 31.
As complete a list as possible of native species and escapes.

o Ibbett, W. C.
**Dawlish violets.**
*Agriculture, Lond.*, 1959, **65**: 515-18.
A short account of a small Devon industry.

p Krüssmann, [G.].
Ergebnis der vorläufigen Azaleen-Sichtung. (**The result of a preliminary survey of azaleas.**)
*Dtsch. Baumsch.*, 1959, **11**: 43-5.
63 varieties belonging to 6 groups briefly described.

q Lindenbein, W.
Beiträge zur Kenntnis der Samen und Früchte. III. *Chrysanthemum* (*Tanacetum*) *vulgare* Bernh. (**Contributions to our knowledge of seeds and fruits. III. *Chrysanthemum vulgare*.**)
*Saatgut-Wirtsch.*, 1959, **11**: 48-9, bibl. 16, illus.
With tabulated data on various seed (fruit) measurements.

r McClintock, E. M.
**A monograph of the genus *Hydrangea*.**
*Diss. Abstr.*, 1959, **19**: 1906-7, being *L.C Card No. Mic*. 58-1430 of 262 pp.
Morphology and taxonomy.

s McCormack, P. F.
**Horticultural treatment of areas subsequen on controlled tipping of household refuse.**
*Rep. annu. Conf. Inst. Park Administ. 1958*
Liverpool, 1958, pp. 20-8.
Development of a riverside park is described

t Metcalf, H. N., and Creech, J. L.
***Echeveria affinis*, a new succulent fron Sinaloa, Mexico.**
*Nat. hort. Mag.*, 1959, **38**: 56, illus.
*E. affinis*, easily grown and readily propa gated from leaf cuttings, shows promise as house plant.

u Morton, J. F.
**Ornamental plants with poisonous properties**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 373-80
Mostly species introduced to Florida.

v Pape, H.
Ein Wickler als Knospenschädling an Flie der. (**A tortrix moth as a pest of lilac buds.**
*Gartenwelt*, 1959, **59**: 141, bibl. 5, illus.
Biology and control of *Tortrix diversana*.

w Paris, C. D., and Haney, W. J.
**Genetic studies in petunia. I. Nine genes fo flower color.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72** 462-72, bibl. 10.

x Plumbridge, A. J.
**Propagation by leaf cuttings.**
*J. Agric. Vict.*, 1959, **57**: 119-23, illus.
Instructions on handling *Begonia*, *Achimenes* *Gloxinia*, *Streptocarpus* and *Saintpaulia*.

y Randolph, L. F., and Mitra, J.
**Karyotypes of *Iris pumila* and relate species.**
*Amer. J. Bot.*, 1959, **46**: 93-102, bibl. 27.

z Reisch, K. W., and Kiplinger, D. C.
**Preliminary studies on the effect of far-re radiation on the flowering of the greenhous chrysanthemum.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72** 498-502, bibl. 9.
For a shorter account see *H.A.*, 28: 2873.

316.

a ROEBERS, F.
Die Eignung verschiedener Zuchtsorten vom Deutschen Weidelgras für die Anlage von Zierrasenflächen. **(The suitability of different varieties of *Lolium perenne* for ornamental lawns.)**
*Gartenwelt*, 1959, **59**: 48-9.
Two years' trials showed the need for further breeding and selection.

b SALIMEI, F. S.
La forsythia. **(Forsythia.)**
*Ital. agric.*, 1959, **96**: 243-6, illus.
Descriptions of varieties and brief notes on propagation by cuttings.

c SHAVER, D. L., AUBERTIN, M. P., AND FOSLER, G. M.
**Chromosome numbers in various horticultural clones of hemerocallis.**
*Ill. St. Flor. Ass. Bull.*, 1958, No. 184, pp. 9-12, illus.
Of 39 clones 37 were diploids (2n=22), one a triploid (2n=33) and one a chimaera (2n=22 and 40+).

d SHEARD, S.
**The seeding and care of lawns in Saskatchewan.**
[*Publ.*] *Sask. Dep. Agric. Plant Ind. Br.*, revised 1957, pp. 14, illus.
For prairie conditions; with notes on types of grass and seed mixtures.

e SHEEHAN, T. J.
**Zingiberaceae for Florida.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 382-8, bibl. 5, illus.
Ornamental species.

f SOKOLOVA, R. S.
**New data on the culture of *Victoria*.** [Russian.]
*Priroda*, 1959, **48** (3): 116-17, illus.
*Victoria amazonica* and *V. cruziana* from fresh, instead of the usual, 2- or 3-year-old seeds.

g STEINER, M. L.
**The Philippine jadevine.**
*Nat. hort. Mag.*, 1959, **38**: 43-5, illus.
*Strongylodon macrobotrys*, a striking perennial climber.

h TASHIRO, H., AND TUTTLE, E. L.
**Carbon disulfide fumigation of the European chafer.**
*J. econ. Ent.*, 1959, **52**: 171-2.
Recommended for treatment of potting soil subject to infestation.

i TEAS, H. J.
**The use of cobalt-60 gamma radiation in ornamental horticulture.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 450-2, bibl. 14, illus.
Notes on work in progress at Gainesville on preservative, genetic and physiological uses.

j VOGELMANN, A.
Chrysanthemum-Auswahlsortiment 1959. **(Selected chrysanthemum varieties 1959.)**
Reprinted from *Zbl. dtsch. ErwGartenb.*, 1959, Vol. **11**, Nos. 12 and 13, as *Suppl. Gartenwelt*, 1959, Vol. **59**, No. 8, pp. 4.
Data on 84 varieties tested at Weihenstephan.

k (WEGMAN, T.)
Nieuwe hulpmiddelen voor de tuinbouwer. **(New apparatus for the horticulturist.)**
*Meded. Dir. Tuinb.*, 1959, **22**: 112-14, illus.
Two pot-plant trolleys and a pot washing device described and illustrated.

l WOLFENBARGER, D. O.
**Some notes on insect pests affecting ornamental plants and on their control.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 370-2, bibl. 3.
Caterpillars, aphids, Cuban laurel thrips, serpentine leaf miner and scale insects.

m WOLFF, W. H.
**Oats with fertilizer help grow better stock.**
*Amer. Nurserym.*, 1959, **109** (2): 12, illus.
September-sown oats proved a useful cover crop in a shrub and bulb nursery.

## SUB-TROPICAL FRUIT AND PLANTATION CROPS.

### *Avocadoes.*

(*See also* 2823, 2917h, j, t.)

17. VENNING, F. D., AND LINCOLN, F. B.
**Developmental morphology of the vegetative axis of avocado (*Persea americana* L.) and its significance to spacing, pruning practices, and yields of the grove.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 350-6, bibl. 3, illus.

he authors describe and discuss the growth and velopment of the vegetative shoot, the developental morphology of axillary buds, dormancy of axillary and terminal buds, the effect of pruning on dormancy and subsequent growth and the effect of light on development. Terminal pruning stimulates only a few buds below the cut, which may emerge as a complex of shoots. The abscission of lateral buds below the pruning cut may result in some die-back. The stimulation of lateral buds that have been dormant for some years results in a weak crotch; shaping of the trees is therefore preferable while they are young. With good growing conditions, spacing below 25 ft. induces vertical growth, while at 30 ft. or wider spacing the growth rate of the main axis in relation to that of lateral growth is reduced once the tree reaches a height of 15–20 ft., and gradually a rounded crown is produced. Triangular spacing is preferred to a square spacing.—Amer. Embassy, Havana, and Fla sub-trop. Exp. Stat., Homestead.

2818. EMBLETON, T. W., AND OTHERS.
**Influence of sampling date, season, and fertilization on macronutrients in Fuerte avocado leaves.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 309-20, bibl. 20.

Analysis of avocado leaves that expanded between April and June over 2 years, showed that N applications increased the percentages of N and P, reduced the percentages of Ca and Mg, and reduced dry weight per leaf. Phosphate applications increased P, Ca, Mg and Cl contents, and reduced K contents. Potash increased K, and reduced Ca and dry weight per leaf; Mg was only slightly reduced. Dolomite applications increased leaf Mg only slightly. Applications of steer manure increased leaf contents of N, P, K and Cl. Contents of Mg, Ca and Cl increased, but P decreased, with leaf age. The percentages of leaf N increased until August, decreased slightly until between December and February, after which there was a sharp increase. Seasonal contents of K were not consistent, except for a sharp drop after February. The dry weight per leaf increased until the beginning of July, remained constant until about February and then again increased slightly.—Univ. Calif., Riverside.

2819. DE LA ROCHA G., G., AND FLORES C., D.
Tolerancia de las diversas especies frutales al contenido de sal en el suelo. (**Tolerance of various kinds of fruit trees to the salt content of the soil.**)
*Bol. trim. Exp. agropec. P.C.E.A. Lima*, 1958, **7** (2): 15-19.

Young fruit trees, potted in sandy soil free from sodium chloride and fertilized with a 12–20–12 mixture, were irrigated with sodium chloride solutions within the range of 0·4–1% for avocadoes and of 1–2·5% for other types. Avocadoes suffered from leaf scorch even at 0·4%, and were killed by 0·8% or 1% solutions. With olives, no adverse effects were noted at or below 1·5%; at 2% the leaves tended to become chlorotic, but even at 2·5% the chlorosis remained slight. Plums on myrobalan rootstocks were unaffected at 1%, damaged at 1·5%, and killed at higher concentrations. Tolerance in oranges was greater on rough lemon rootstocks (2% was slightly damaging, 1·5% harmless) than on tangelo or Cleopatra mandarin, where 1·5% caused some casualties, or on sweet orange, where only 30% of the plants survived 1·5%. Lemons were not completely tolerant to 1% salt, and neither apples nor vines could survive at this concentration.

2820. WALLACE, A., BIELY, M. I., AND BHAN, K. C.
**Ammonium bicarbonate toxicity.**
*Calif. Agric.*, 1959, **13** (3): 12.

Avocado roots were severely injured in solution culture by ammonium bicarbonate within 72 hrs and by urea with bicarbonate in about 7 days; they were visibly injured by ammonium sulphate in the presence of calcium carbonate in about 2 weeks. There was some injury with bicarbonate in the presence of nitrate within about 3 weeks. Citrus seedling roots were injured in a similar way, but more slowly. Phytotoxic symptoms were considerable at bicarbonate concentrations of 10 m.e. per litre or above. No injury occurred with ammonia or nitrate alone. Preliminary tests indicated that there may possibly be a phytotoxicity problem when ammonium N fertilizers are applied to alkaline or calcareous soils in which bicarbonates are always present.

### *Citrus—general.*

(*See also* 2025, 2917c, 3107.)

2821. BURKE, J. H.
**Citrus industry of Brazil.**
*Foreign agric. Rep. U.S. Dep. Agric.* **109,** 1958, pp. 33, illus., 20 cents.

In this report the author touches on the history of the Brazilian citrus industry and gives details of acreages, producing areas, rootstocks, pests and diseases, experiment stations, varieties, costs, marketing and processing. The industry as a whole is viewed from the standpoint of competition with Florida in the export of oranges to Europe during the summer. In this Brazil is handicapped by a relatively large acreage planted to varieties that are unsuitable for export and by the prevalence of tristeza and other virus diseases.

2822. KNORR, L. C.
**Finding the best lemon for Florida—a report of progress. I. The growing of lemons in Florida: historical, varietal and cultural considerations.**
WENZEL, F. W., AND OTHERS.
**Idem. II. Use of Florida lemons in frozen concentrate for lemonade.**
KESTERSON, J. W., AND HENDRICKSON, R.
**Idem. III. Evaluation of coldpressed Florida lemon oil and lemon bioflavonoids.**
GRIERSON, W.
**Idem. IV. Florida lemons for fresh fruit use.**
REITZ, H. J.
**Idem. V. General conclusions regarding the best lemon for Florida.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 123-8, bibl. 4; 129-32, bibl. 7; 132-40, bibl. 5; 140-4, bibl. 11; and 144-6, bibl. 1, and reprinted in *Citrus Ind.*, 1959, Vol. **40,** No. 4 onwards.

The demand for lemons by the frozen concentrate ndustry has stimulated interest in lemon growing n Florida. In these articles numerous lemon elections are described from various standpoints. The screening programme is continuing, and efinite varietal recommendations cannot yet be nade.—Fla. Citrus Exp. Stat., Lake Alfred.

2823. HOCHSTIM, E. S., AND CLAYTON, L. Y.
**Homemakers appraise citrus products, avocados, dates and raisins.**
*Mktg Res. Rep. U.S. Dep. Agric.* **243,** 1958, pp. 133.

The questionnaire is set out in full and answers nalysed and tabulated in most conceivable ways. t should be of value to anyone connected with the dvertising of the products concerned or similar roducts. To those who dote on figures it is bliss neffable.

2824. COOK, P. H.
**Push button brush cutting.**
*Calif. Citrogr.*, 1959, **44**: 132-3, illus.

Two automatic brush cutters are described, which re used to dispose of citrus prunings. Both are ractor-mounted and cover about 3 acres per hour. n one the prunings are picked up automatically efore being chewed up. In the other the prunings ass through a chipping machine.

### *Citrus—varieties, propagation and rootstocks.*

(*See also* 2917r, 2918b, i.)

2825. SAMSON, J. A., AND BYRON, D. G.
Veredeling van sinaasappels in Suriname. **(The selection of oranges in Surinam.)** [English summary ½ p.]
*Surinaam. Landb.*, 1958, **6**: 98-102, bibl. 9.

rom a selection programme, started in 1922, watta 202 was chosen for large-scale propagation. ater, it became clear that there was more than one train of this variety, and in a re-selection proramme 2 trees have now been chosen for multipliation because of their superior fruit quality.

2826. JAUHARI, O. S., AND RAHMAN, S. F.
**Further investigation on rooting in cuttings of sweet lime (*Citrus limettoides*) Tanaka.**
*Sci. and Cult.*, 1959, **24**: 432-4, bibl. 1, illus.

Using a previously reported technique [*H.A.*, 29: 89] and a mixture of 50 p.p.m. each of IAA and NAA, 50% rooting was obtained with cuttings lanted in February. Other hormone treatments nd November planting were less successful.—Govt agric. Coll., Kanpur.

827. PIRCHALAJŠVILI, S. H.
**Better rootstocks for citrus.** [Russian.]
*Bjull. Vses. n.-i. In-ta Čaja i subtrop. Kul'tur*, 1956, No. 4, pp. 72-80, from *Ref. Ž.* (*Biol.*), 1958, No. 5, Abstr. 20,532.

Preliminary results are given of experiments conducted in 1950-1956. The rootstocks studied were trifoliate orange, bigarade, Kaba lemon, seedlings of Novogruzinskij lemon and Mestnyj orange, Natsu-Mikan, *Citrus junos*, Duncan grapefruit, citrange and Kinkan [kumquat]; the scion varieties were Novogruzinskij lemon, seedlings of the same, seedlings of Monacello lemon, Washington Navel orange, seedlings of Mestnyj orange, and Unshiu mandarin. Trifoliate orange appeared to be the most suitable rootstock for all citrus grown in the open. It was compatible, improved frost resistance, induced early bearing and ensured moderate growth.

2828. GOPALKRISHNA, N., AND KUNTE, Y. N.
**Résumé of research on Nagpur mandarin orange and need for its intensification in the development of citrus industry in the Vidharbha region.**
*Poona agric. Coll. Mag.*, 1958, **49**: 19-25, bibl. 4.

*Rootstocks.* Seed germination of 13 stocks ranged between 67% and 97%. Varietal differences in the degree of polyembryony were noted. Buds of Santra united best with seedlings having stem diameters of 3·8–3·9 cm., and buds without wood, inserted in T-cuts, were the most successful. Trees on sweet lemon and on Rangpur lime grew larger and produced higher yields than trees on Jamburi and sweet lime. Rangpur lime is considered to be the most promising stock. *Manurial trial.* Groundnut cake plus ammonium sulphate improved leaf colour of Santra trees on Jamburi stock.

2829. MUKHERJEE, S. K., AND CAMERON, J. W.
**Tree size and chromosome number in a trial of tetraploid trifoliate orange as a citrus rootstock.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 267-72, bibl. 16, illus.

In a trial, in which seedlings of tetraploid and diploid strains of trifoliate orange were used as rootstocks for 6 scion varieties, tree size was highly variable. Aneuploidy was postulated as a possible cause of variability, but in all counts taken chromosomes numbered 36. The authors discuss the possibility that euploid gametic seedlings or some degree of diploid-tetraploid incompatibility may be responsible for the growth variation. Secondary constrictions and satellites were observed on several pairs of chromosomes from the tetraploid plants.—Univ. Calif., Riverside.

2830. KOLELIŠVILI, M. V.
**The importance of a mentor in lemon selection.** [Russian.]
*Agrobiologija*, 1958, No. 4, pp. 73-9, illus.

When seedlings of *Poncirus trifoliata*, *Citrus junos-juzu* and *C. wilsonii* were tested at Suhumi as root mentors for hybrid lemon seedlings, *P. trifoliata* was found to be the most suitable, producing the most hardy plants. Among the trifoliate populations low-growing, early-bearing forms were observed to be less frost resistant; hence for rootstock production seed from vigorous hardy mother trees should be used. Grafting hybrid lemon seedlings into the crown of Unshiu mandarin also improved frost resistance and fruit quality and induced early bearing compared with seedling plants or those grafted onto young rootstocks.

### *Citrus—climatic factors.*

(*See also* 2837, 2917o, 2918j.)

2831. Monselise, S. P., and Turrell, F. M.
**Tenderness, climate and citrus fruit.**
*Science*, 1959, **129**: 639-40, bibl. 4.

In a survey of 4 varieties of mature citrus fruit from 4 climatic districts in southern California, peels were examined for moisture content and tenderness as measured by puncture-pressure. These were found to be inversely correlated with air temperature and evaporation. Tenderness, which includes a tendency to damage by fumigation, oil sprays and storage practices, was greatest in coastal-grown fruit and least in fruit grown in the drier interior. It appears that climatic differences cause similar morphological changes in fruit as in leaves. The hardening effect of moisture stress, as shown by lower moisture percentage and greater puncture pressure, was also exhibited by fruit from the tree tops as compared with fruit from lower on the tree. —Hebrew Univ., Rehovot, Israel, and Univ. Calif., Riverside.

2832. McCown, J. T.
**Field observations of Florida citrus following the 1957-58 freezes.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 152-7, bibl. 1.

The relationship of frost resistance in citrus to dormancy, tree vigour, rootstocks, scion variety and fruit characters is discussed. Factors resulting in satisfactory protection by heaters and sprinkler irrigation are also considered. Mature trees which were moderately or severely damaged responded most favourably when pruned immediately after the first flush of growth had matured. Young trees recovered best when pruning was done shortly after their protecting banks of soil had been removed.—Fla agric. Ext. Serv., Gainesville.

2833. Smith, P. F., and Rasmussen, G. K.
**Relation of fertilization to winter injury of citrus trees.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 170-5, bibl. 7, and *Citrus Ind.*, 1959, **40** (2): 5-7, 18, bibl. 7.

In general the nutrient status of the tree above deficiency levels had only a slight effect on cold tolerance. High rates of N fertilization had a small but definite tendency to increase tree resistance to frost injury, while high rates of K fertilization tended to reduce the cold resistance of the trees. Differential supplies of P, Cu, Zn and Mn had no effect on the degree of frost injury sustained. Young trees in their first year in the field showed less injury when the last fertilizer application of the season was made in late August than when the trees were fed again in October. This effect was not apparent with 2-year-old trees. Young trees, stunted for lack of P on Lakewood sand, were more severely damaged in each of 2 years by cold than trees adequately supplied with P.—U.S.D.A., Orlando.

2834. Rouse, A. H., Atkins, C. D., and Moore, E. L.
**Chemical characteristics of citrus juices from freeze-damaged fruit.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 216-20, bibl. 14.

Following freeze injury citrus fruit possessed lower acidity, a higher Brix/acid ratio, a higher pH and more flavonoids. Juice from Pineapple oranges and seedy grapefruit, frozen after maturity, showed decreases in pectinesterase, light transmission and sodium hydroxide-soluble pectin (as a percentage of total pectin); the relative viscosity of serum and water-soluble pectin increased. Changes in juice characteristics of Valencia oranges (immature at the time of freezing) were often in the opposite direction to those of earlier-maturing varieties. Extraction and finishing techniques also affected the juice characters of Valencia oranges.—Fla Citrus Exp. Stat., Lake Alfred.

### *Citrus—nutrition and salinity problems.*

(*See also* 2819, 2820, 2828, 2833.)

2835. Burkhart, L.
**Arizona citrus notes.**
*Calif. Citrogr.*, 1959, **44**: 180.

In a non-silted sandy soil, N at an intermediate level (2½ lb. per tree) resulted in higher yields from 5-year-old Lisbon lemon trees than did higher or lower N levels. Additional $P_2O_5$ at all N levels increased yields by 110–128%. The highest yields were obtained at the intermediate N dosage plus triple superphosphate (2 lb. $P_2O_5$ per tree) and manure (10 tons per acre).

2836. Bouma, D.
**Growth, yield, and fruit quality in a factorial field experiment with citrus in relation to changes in phosphorus nutrition.**
*Aust. J. agric. Res.*, 1959, **10**: 41-51, bibl. 9.

Summer clean cultivation was compared with 2 no-tillage treatments—a grass sod treatment and a bare surface treatment. All cultural treatments were combined with 4 N levels. In the sod treatment yields at the higher N levels increased markedly following the application of superhosphate. Although initially superior, yields from ne bare surface treatment decreased to below those f the tilled treatment, but they improved after the pplication of superphosphate, until they became igher than those of the tilled treatment. Fruit uality was improved by the application of superhosphate but deteriorated with increasing N upply in all cultural treatments.—Irrig. Res. Stat., riffith. M.C.S.

837. SPENCER, W. F.
**The effects of phosphate and lime applications on growth, root distribution, and freeze injury of young grapefruit trees.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 106-14, bibl. 20, illus.

arious amounts of phosphate and limestone were pplied, alone and in combination, to Ruby Red rapefruit trees growing on a sandy soil of pH 4·5. rowth measurements showed that trees receiving $_2O_5$, alone or in combination with lime, were ignificantly smaller than trees receiving lime only. $_2O_5$ applications markedly reduced the concentra-on of feeder roots, especially in the surface foot f soil; in deeper root zones there were reductions root growth at the highest rate (4,880 lb./acre). ollowing low temperatures during the winter of 957-58, the average amount of dead wood pruned om trees receiving lime only was 5%, from $O_5$-only trees 15·2%, and from trees receiving $O_5$ plus lime 16·9%. The effects of high rates lime on soil pH were apparent down to at least ft.—Fla Citrus Exp. Stat., Lake Alfred.

838. WILLSON, A. E., AND AREY, W. J.
**Potash relationships in commercial groves.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 181-6, bibl. 8, and *Citrus Ind.*, 1959, **40** (2): 14-16, 21-3, bibl. 8.

igh solids contents in the fruit from Pineapple and alencia orange groves were associated with low eaf K, but leaf K/fruit quality relationships were ot consistent over a 7-year period. Potassium evels of 0·8% and less were associated with ncreased fruit drop and a probable decrease in ields in some years. It is recommended that the content of spring flush leaves 5 to 7 months old hould not drop below 1%.—Minute Maid Corp., lymouth, Fla.

839. BRYAN, O. C.
**The mysterious role of potassium in plant growth and citrus fertilizer practices.**
*Citrus Ind.*, 1959, **40** (3): 9-10, bibl. 6.

n the Short Research Grove on Lakeland sand, ruit set and fruit size were not reduced by extremely ow K levels, although fruits were smaller. Low K rees had less rust mite and greasy spot than trees eceiving K at high rates. Trees receiving high rates f K produced larger and coarser fruits and were ss resistant to cold than trees receiving less K.

2840. EMBLETON, T. W., AND JONES, W. W.
**Magnesium deficiency of orange trees and its correction.**
*Calif. Citrogr.*, 1959, **44**: 219, 236-40, bibl. 16, illus.

Magnesium deficiency in orange trees was corrected with foliar sprays of magnesium nitrate applied at 10 lb./100 gal. when the spring flush of growth was about two-thirds expanded. Magnesium nitrate sprays increased leaf Mg contents, and Mg deficiency symptoms disappeared in about 6 months. Foliar sprays of a Mg chelate at 4 or 5 lb./100 gal. caused fruit injury and were less effective than magnesium nitrate sprays.

2841. LABANAUSKAS, C. K., AND OTHERS.
**Micronutrient concentrations.**
*Calif. Agric.*, 1959, **13** (2): 10, 15.
**Micronutrients in Valencia leaves.**
*Calif. Citrogr.*, 1959, **44**: 174-5, 177.

In leaves of Valencia trees, given 20 lb. of triple superphosphate in each of 3 successive years, Cu contents were lower and Mn and Fe contents were higher than in non-fertilized trees. Zinc contents were reduced slightly but not significantly, but B contents were not affected. Applications of 20 lb. of potassium sulphate per tree increased B and reduced Mn concentrations but did not affect Zn, Cu and Fe contents. The leaves of trees receiving 2 20-lb. dressings of dolomite contained less Cu than those of trees receiving no dolomite or 2 50-lb. dressings. Dolomite did not affect Zn, B and Fe contents but tended to reduce Mn contents slightly. [See also *H.A.*, 29, 1820.]—Univ. Calif., Riverside.

2842. KAMALI, A. R., AND CHILDERS, N. F.
**Response of orange seedlings to a fritted form of trace elements.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 290-6, bibl. 18.

Growth of Valencia orange seedlings, as measured by plant height, linear growth, total fresh and dry weight of leaves, stems and roots, and leaf area and number, was similar when trace elements were applied in a fritted form (at 50, 75 and 125 lb. per acre) as when the same elements (B, Cu, Fe, Mn, Mo and Zn) were supplied as soluble salts. At harvest leaf contents of Cu, Fe and Mn with the 125-lb. treatment of fritted trace elements were comparable with those in seedlings receiving trace elements from soluble salts; B, Mo and Zn contents were lower, but apparently adequate for satisfactory growth.—Rutgers Univ., New Brunswick, N.J.

2843. BREWER, R. F., AND OTHERS.
**Effect of fluorine additions to substrate on navel orange trees grown in solution cultures.**
*Soil Sci.*, 1959, **87**: 183-8, bibl. 10, illus.

The growth rate and yield of 4-year-old Washington

Navel orange trees grown in a nutrient solution were markedly reduced by the addition of 25 p.p.m. of F as HF, which resulted in foliar F reaching 34–59 p.p.m. At 100 p.p.m. in the solution the trees immediately collapsed. The leaves of healthy orange trees contained less than 10 p.p.m. of F on a dry weight basis. The accumulation of F in the leaves from root absorption was considerably less than that from an atmospheric concentration 2,000 times lower, and atmospheric absorption did not lead to accumulation in the roots. The effects of F toxicity on fruit composition and quality are recorded.—Univ. Calif., Riverside.

2844. Wallace, A., and Mueller, R. T.
**Responses of plants to zinc and manganese chelates.**
*Proc. Soil Sci. Soc. Amer.*, 1959, **23**: 79.

The plants used, as small seedlings or cuttings, included macadamia, pyracantha and rough lemon. Leaves, stems and roots were analysed for labelled Zn and EDTA after the plants had been kept for several days in aerated solutions containing $Zn^{65}$ and $C^{14}$ chelates, with no other chemicals except small amounts used to control pH. In all 3 species the ratio of EDTA to Zn was highest in the leaves, and in pyracantha and lemon it was lowest in the roots. Experiments with Mn chelates concerned only soya beans.

2845. Bryan, O. C.
**Soil applications of zinc prove successful for citrus with a balanced nutrient program.**
*Citrus Mag.*, 1959, **21** (9): 12, 20-1, bibl. 10.

Results from Zn studies in a citrus grove are discussed, and it is concluded that high soil pH and high active phosphate impede Zn utilization by citrus. Citrus extracted sufficient Zn from soils with relatively low Zn contents and from insoluble materials, when other nutrients were balanced.—Soil Sci. Foundation, Lakeland, Fla.

2846. Eaton, F. M., and Harding, R. B.
**Foliar uptake of salt constituents of water by citrus plants during intermittent sprinkling and immersion.**
*Plant Physiol.*, 1959, **34**: 22-6, bibl. 11.

Lemon and orange trees were sprinkled with synthetic irrigation water similar to that which has caused trouble in orchards. Leaf accumulation of Na and Cl was greater when the trees were intermittently sprinkled than when they were continuously sprinkled, and also greater by day than by night. This indicated that extensive uptake of ions occurred only when the concentration of the film on the leaf surface was increased by evaporation. Orange and lemon plants were also inverted and the tops immersed in aerated single-salt solutions overnight. Foliar absorption by this procedure showed fairly uniform cation accumulation, except when there was a heavy uptake of associated chlorides.—Univ. Calif., Riverside.

2847. Groenewegen, H., Bouma, D., and Gates, C. T.
**Uptake and translocation of chlorine in citrus cuttings during and after a short salt treatment.**
*Aust. J. biol. Sci.*, 1959, **12**: 16-25, bibl. 16.

Rooted citrus [Washington Navel orange] cuttings were subjected to a short salinity stress and after salt removal the chlorine redistribution was studied over a period of 82 days. No significant change was found in the chlorine content of leaves present at the date of salt removal. No significant loss of chlorine from the plant as a whole occurred. Chlorine moved upwards; roots and old-cycle stems showed an initial rapid decrease in chlorine, after which the release of chlorine previously accumulated in these parts was slow. [Authors' summary.]—Irrig. Res. Stat., Griffith.

2848. de Boixo, —.
Expérience d'épandage du plâtre dans l'orangerie du Bled Chéraia (Maroc) en vue de combattre les méfaits des eaux salées. **(Trials on spreading gypsum in the orange grove of Bled Chéraia (Morocco) to counteract the ill effects of saline water.)**
*C.R. Acad. Agric. Fr.*, 1958, **44**: 748-57.

The effects of 4 levels of gypsum application on the Na and Cl contents of the soil and on leaf colour are described. Applications of 3,000–4,000 kg./ha. successfully reduced salinity.

### *Citrus—growth and physiology.*

2849. Ito, H., Fujita, K., and Ogaki, C.
**Investigations on the cause and control of alternate bearing of Unshiu orange trees. (2) The time range during which buds can be influenced to initiate flower primordia.** [Japanese, with English summary ½ p.]
*J. hort. Ass. Japan*, 1958, **27**: 249-55, bibl. 7, illus.

The blossom bud/node ratio tended to decrease as the time of branch ringing was postponed, and to increase as defoliation was delayed. Ringing or defoliation about the beginning of March had little effect on the blossom bud/node ratio. [For Part 1 see *H.A.*, 29: 803.]

2850. Nekrasova, T. V.
**Physiological characteristics of ringed citrus branches.** [Russian, with English summary ¼ p.]
*Fiziol. Rast.*, 1958, **5**: 509-15, bibl. 17.

The ringing of branches in citrus, by reducing the flow of labile and physiologically active substances from the leaves to the roots, retards vegetative growth and accelerates generative development.

The leaves of ringed branches show increases in tarch accumulation, in the hydrolysis of pigments and proteins, in reducing capacity and in sap oncentration.

2851. Radatz, W.
Untersuchungen zur Gelbnervigkeit der Apfelsinenblätter *Citrus aurantium sinensis* (Gall.). (**Studies on vein chlorosis in orange leaves.**) [English summary 1 p.]
*Phytopath. Z.*, 1959, **35**: 148-72, bibl. 35, illus.

The anatomy of orange leaves is described and eference is made to seasonal variations in the ccumulation of starch. Vein chlorosis of seedlings was reproduced by ringing the shoot, but not—at east under normal conditions—by cutting the median leaf vein. Different periods of illumination during the winter showed the expression of symptoms to be associated with increased photosynthesis nd the accumulation of starch. The results of another experiment suggest that pathologically inreased respiration plays a part in the formation of vein chlorosis. Abnormal starch accumulation in diseased leaves due to increased respiration, closure f the stomata due to oxygen deficiency, and the rect leaf position due to a disturbance of the normal ion antagonism appear to be related. The ntense blackening of the protoplasm and of the membrane in the leaves affected with vein chlorosis ollowing certain treatments indicate that phoshates in the cells are involved in the reaction. These are assumed to accumulate in the mesophyll ells, together with the starch, as a result of the loss f a gradient and the blockage of assimilates. Normally phosphatase activity is believed to be nvolved in the active translocation of carboydrates. A reduction of this activity in deeply planted orange trees, due to oxygen deficiency, is egarded as the factor responsible for the development of vein chlorosis.—Bot. Inst. tech. Hochsch,. Brunswick.

2852. Resnik, M. E.
Fisiología y longevidad del polen en los citrus. (**Physiology and longevity of citrus pollen.**)
*Rev. Invest. agríc. B. Aires*, 1958, **12**: 311-43, bibl. 28, illus.

Shamouti orange, Marsh seedless grapefruit, Temple orange, Meyer and Eureka lemons, *Poncirus trifoliata* and *Fortunella* sp. were used in hese pollen studies. Abnormal pollen grains were common, and in some Shamouti orange varieties considerably less than half the pollen was normal. With Eureka lemon and *P. trifoliata* pollen percentage germination increased with increasing concentration of the sucrose medium up to 50%, and with Meyer lemon pollen up to 25%. In Shamouti orange, however, germination was progressively reduced by raising the sucrose concentration from 15% to 25, 40 and 50%. In Temple orange the response was not clearly marked. Meyer lemon pollen significantly increased its percentage germination on addition of the following substances to the sucrose: 150 p.p.m. thiamine, 10 or 100 p.p.m. boric acid, and 50 or 150 p.p.m. IBA. It did not respond to 100 p.p.m. 2,4-D or 50 p.p.m. thiamine. For Eureka lemon pollen, the optimal temperature for germination was about 25° C. and that for tube growth was 30° C. Citrus pollen could not be coloured by the usual agents used for testing vitality. The loss of vitality with age was more rapid in light than in darkness. *Fortunella* pollen remaining in the anthers until the 2nd day after the flower had opened had a much lower germination percentage than that collected on the 1st day. The storage life of *P. trifoliata* pollen was lengthened by cold storage at −5° C. That of Temple orange pollen was reduced at −5° C., but it was increased at 16° C. and by high concentrations of $CO_2$ in the atmosphere. Shamouti orange pollen needed both low temperature and $CO_2$ to increase its storage life. Sulphuric acid was injurious when used to dry the air for pollen storage.

2853. Cooper, W. C., and Peynado, A.
**Effect of gibberellic acid on growth and dormancy in citrus.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 284-9, bibl. 24, illus.

Foliage sprays of gibberellic acid (10 to 1,000 p.p.m.) applied to young Webb Red Blush trees on sour orange resulted in some elongation of individual shoots, especially at 1,000 p.p.m., but total shoot elongation of the tree was not increased. Thorns (indicative of juvenility) developed on some vigorous new shoots after treatment, and some treated shoots also developed malformed long, narrow leaves. The main effect of gibberellin treatment was to break or to shorten dormancy.—U.S.D.A., and Texas agric. Exp. Stat., Weslaco.

2854. Swamy, N. S. R.
**Morphogenetic response of *Citrus* ovules to growth adjuvants in culture.**
*Nature*, 1959, **183**: 735-6, bibl. 5, illus.

Excised ovules of *C. microcarpa* were cultured on media with various added growth supplements. The ovules became hypertrophied and irregular in outline, especially on malt extract. A periderm-like tissue was formed from the outer integument in almost all treatments. The development observed on each medium is described.

2855. Kordan, H. A.
**Proliferation of excised juice vesicles of lemon *in vitro*.**
*Science*, 1959, **129**: 779-80, bibl. 3, illus.

Juice vesicles from mature lemon fruits will proliferate *in vitro* for indefinite periods. The comparatively simple tissue grows on a synthetic nutrient medium almost entirely inorganic in composition. [Author's abstract.] The composition of the nutrient solution is tabulated.—Univ. Calif., Los Angeles.

### *Citrus—diseases and pests.*

(*See also* 2357, 2360, 2917d, e, m, v, x, 2918a, h.)

2856. NAGPAL, R. L.

**Presence of tristeza and other virus diseases of citrus in Bombay State, India.**

*FAO Plant Prot. Bull.*, 1958, **7**: 37-8, bibl. 4, illus.

**The causes of "dieback" diseases of sweet orange (*mosambi*) in Bombay State and possible methods of their control.**

*Sci. and Cult.*, 1959, **24**: 478-81, bibl. 6, illus.

The writer suspected viruses to be the cause of decline diseases in citrus in this State in 1954. Comparison of the starch contents of healthy and diseased trees pointed to tristeza as the probable cause, and the effect of budwood grafts from affected trees on sour lime seedlings confirmed this. Later grafting work on sour orange and sweet lime stocks indicated the presence of xyloporosis, and the symptoms of both psorosis A and B have also been observed.

The use of nucellar scion wood and tolerant rootstocks may assist in control.—Coll. Agric., Poona. H.L.

2857. CALAVAN, E. C., SOOST, R. K., AND CAMERON, J. W.

**Exocortis-like symptoms on unbudded seedlings and rootstocks of *Poncirus trifoliata* with seedling-line tops, and probable spread of exocortis in a nursery.**

*Plant Dis. Reptr*, 1959, **43**: 374-9, bibl. 5, illus.

Subterranean symptoms resembling, but not typical for, those of exocortis have appeared on presumably uninoculated seedlings and on rootstocks grown from seed of a similarly affected diploid trifoliate orange parent tree. Probable spread of exocortis within a nursery in the direction of water flow is reported. [Authors' summary.] It appears likely that two disorders are involved, the one transmissible exocortis and the other a disorder with symptoms resembling those of exocortis but most probably caused by genetic factors.—Univ. Calif., Riverside.

2858. (GOODALL, G. E.)

**Citrus Field Research, Inc., reports.**

*Calif. Citrogr.*, 1959, **44**: 172-3.

In Santa Barbara County, an exocortis survey showed no disease in Blanchard, Cascade nucellar, Frost Eureka nucellar, Thornton nucellar, Bevins R 16, Prior 14–18, Walker and Frost Lisbon nucellar. Exocortis was found in Cascade, Ross 10–1, Fritz 3–2, Hales No. 2, Monroe 1–7, Prior 5–5, Prior 22–1, Wheeler Messina and Wohlford. Citrus nematodes in the root area of mature citrus trees were successfully controlled by fumigation with DBCP, which was machine-injected between the rows. At a rate of 5 gal./acre DBCP improved yields by 10% in the first year and by 23% in the second. However, DBCP did not diffuse well in medium to heavy soils or where tight cultivation pans had developed.

2859. FISHER, F. E.

**Ferbam will control citrus scab.**

*Citrus Mag.*, 1959, **21** (6): 14, 28, bibl. 4, illus.

Preliminary tests showed that ferbam was an excellent protective fungicide against scab (*Elsinoë fawcetti*), when applied to both nursery and producing trees. In more extensive trials two applications of ferbam gave better control of scab on fruit and leaves than did 2 applications of copper. A delayed dormant application of copper followed by an application of ferbam at ⅔ petal fall was as effective as 2 applications of ferbam in protecting the fruit, but not the leaves. Recommendations for applying ferbam are given.—Fla Citrus Exp. Stat., Lake Alfred.

2860. KLOTZ, L. J., DEWOLFE, T. A., AND WONG, P-P.

**Decay of fibrous roots of citrus.**

*Phytopathology*, 1958, **48**: 616-22, bibl. 18, illus.

The importance of *Phytophthora citrophthora* and *P. parasitica* as destroyers of fibrous feeder roots of citrus was demonstrated. Environmental factors that favoured parasitism were excess water and organic matter in the soil. Seedlings fertilized with ammonium sulphate or urea were more susceptible to attacks of these fungi than those receiving calcium nitrate. Trifoliate orange rootlets showed resistance to parasitism by these fungi. Control of fibrous root rot in susceptible rootstocks can be effected by using uncontaminated or disinfected seeds; by planting in disinfected seedbed, nursery, and orchard sites; by irrigating with disinfected water; by protecting planting sites during the first 2 years from contamination by run-off water; and by practising sound cultural methods.—Univ. Calif., Riverside.

2861. KING, J. R.

**Occurrence, distribution and control of Fuller's rose beetle in Florida citrus groves.**

*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 146-52, bibl. 4, illus., and *Citrus Ind.*, 1959, **40** (3): 18-20, 26-8, bibl. 4, illus.

Severe root injury to citrus by larvae of *Pantomorus godmani* may be prevented by application to the soil of 2 to 5 lb. of technical aldrin, dieldrin or ptachlor per acre. Fertilizers can be mixed with anular formulations. Distribution of the insecti-des was more even with 2 applications, in autumn d spring, each of 2·5 lb./acre than with a single lb./acre application.—Fla Citrus Exp. Stat., ake Alfred.

62. Spencer, H., and Selhime, A. G.
**Four years of experiments with new miticides and insecticides.**
*Proc. Fla St. hort. Soc.*, *1958*, 1959, **71**: 179-81, *Citrus Ind.*, 1959, **40** (3): 40, 43, and *Citrus Mag.*, 1959, **21** (11): 14-15.

xcellent immediate control of red mites (*Panony-us citri*) was obtained with Thimet, Hercules C-528, Trithion, Kelthane, Chipman R-6199, and hipman R-6200, and these materials were more rsistent than those currently recommended. For st mites (*Phyllocoptruta oleivora*) Chlorobenzi-te, Trithion, zineb, maneb, Chipman R-6199 and -6200 were equal to, or better than, wettable lphur. Examples are given of combination rays which have controlled scales, red mites and st mites.—U.S.D.A., Orlando.

63. Johnson, R. B.
**Rust mite control with materials applied in oil emulsion.**
*Proc. Fla St. hort. Soc.*, *1958*, 1959, 71: 95-9, bibl. 6.

aneb, Chlorobenzilate, Trithion and Delnav .3-*p*-dioxanodithiol-bis-(O,O-diethylphosphoro-hioate)) applications did not injure fruit or iage, and, when applied in emulsified oil, they used significant reductions in citrus rust mite *hyllocoptruta oleivora*) infestation. The amount russeted fruit was also reduced.—Fla Citrus p. Stat., Lake Alfred.

64. Swirski, E.
**Further trials in the control of the citrus rust mite (*Phyllocoptruta oleivora* Ashm.).**
*Ktavim*, 1958, **9**: 43-56, bibl. 11, illus.

afran (25% lime-sulphur) at 1% was very effective ut left a deposit on the fruit which should be ashed off before packing. Chlorobenzilate (25%) 0·1% gave a high initial kill and had a good sidual effect, but it was not so persistent as afran. Chlorobenzilate is considered preferable Diazinon. Phenkaptan and R6199 also gave tisfactory control, but the latter is toxic to mans, and both require further trial.

65. DeBach, P., Landi, J., and Jeppson, L.
**Integrating chemical control of mites with biological control of red scale.**
*Calif. Citrogr.*, 1959, **44**: 205-9.

ray treatments with the acaricides Trithion, elnav, Kelthane and Tedion against red and bud ites did not cause any significant upset in the lationship between the parasite, *Aphytis*, and its host, the California red scale. Delnav and Trithion, however, showed some toxicity to *Aphytis* in laboratory tests, and were associated with a slight reduction in parasitic activity in the field; hence Tedion or Kelthane are preferred materials.

2866. Johnston, C. J. R.
**Red scale. Report on control by chemicals and natural enemies in Mildura and Cobram districts in 1957-58 season.**
*Citrus News*, 1958, **34**: 136-7.

Tests of 9 schedules for red scale control favoured fumigation with hydrocyanic acid gas. Two sprays of 0·06% parathion gave control equal to fumigation or to fumigation followed by white oil. One spray of white oil (1: 40) gave adequate control and was cheaper than other rather more effective materials. A single spray of parathion per year at 0·06% failed to equal the control given by a white oil at 1: 40 or 1: 50 or by 0·06% malathion plus a 1: 80 mayonnaise emulsion of oil. There was no difference in scale control between malathion sprays applied in October, November or January. In a heavy scale infestation at Cobram, timing of the sprays (malathion and/or oil) was important, the best results being obtained with a February or March spray following an early spray in January, December or October in that order of preference. At Merbein, where natural control was very good, scale treatments were unnecessary. The difference in scale control between fruit harvested from the top and from the bottom of the tree was 38% with white oil, 27% with white oil plus malathion and only 1½% with fumigation.

2867. Cressman, A. W.
**Effectiveness of different formulations of insecticides against California red scale.**
*J. econ. Ent.*, 1958, **51**: 911-12, bibl. 4.

In screening tests emulsified kerosene solutions of organic phosphorus compounds, such as Trithion and Guthion, were more effective against adult *Aonidiella aurantii* than wettable powder sprays.—Ent. Res. Div., U.S.D.A.

2868. Thompson, W. L.
**The value of post-bloom scalicides.**
*Citrus Mag.*, 1959, **21** (7): 18-19, 32, 37, bibl. 2.

Results of experimental work indicate that purple and chaff scales start to infest fruit and leaves in the spring and early summer, and that control with a summer spray is not so effective on the fruit as on the leaves. A post-blossom spray should therefore be applied before the fruit becomes infested, followed by a second application in the summer. Parathion at 0·15–0·25 lb./100 gal. or malathion at 0·75–1·0 lb./100 gal. are preferred for the post-blossom spray, and also for the summer application, when fruit colour and solids are important.

2869. Atkins, E. L., Jr.
**The western tussock moth, *Hemerocampa vetusta* (Bdv.), on citrus in Southern California.**
*J. econ. Ent.*, 1958, **51**: 762-5, bibl. 6.

The larvae of the moth caused economic losses in a large acreage of oranges during the springs of 1956 and 1957, when population levels reached 1,000 larvae per tree. They destroyed new spring growth, newly set fruit and scarred maturing oranges. Beneficial insects caused a reduction of about 50% of the tussock moth population in some groves. In chemical control studies parathion, TDE, DDT, Dilan, Guthion, Sevin, methyl parathion and Phosdrin gave excellent control. Parathion, TDE and DDT are registered for use on citrus and are recommended to be applied as complete foliage sprays at 2, 5 and 5 lb./ac., respectively, of actual toxicant.—Univ. Calif., Riverside.

2870. Hernández, E., and Villar, J.
Densidad de población de la mosca prieta de los cítricos (*Aleurocanthus woglumi* Ashby) en la región de Valles, San Luis Potosí, México, con relación a clima, riego y aplicación de insecticidas. (**Population density of citrus white fly (*Aleurocanthus woglumi*) in the region of Valles, San Luis Potosí, Mexico, in relation to climate, irrigation and insecticide applications.**)
*Rep. III Reun. interamer. Fitogen. Fitopat. Ent. Edafól., Bogotá, 1955*, 1958, p. 259.

White fly populations were high in irrigated citrus orchards, but in areas with well defined wet and dry seasons they declined markedly during drought. The application of powdered cubé [*Lonchocarpus* sp.] in oil sprays also produced marked reductions.

2871. Ebeling, W.
La mosca blanca lanuda de los cítricos. (**The citrus woolly white fly.**)
*Divulg. Inform. Minist. Agric. Perú* **18,** 1957, pp. 1-11, illus., from *Trop. Abstr.*, 1959, **14,** Abstr. g491.

*Aleurothrixus howardii* has become of increasing importance in Peru in recent years. Parathion is recommended, with care to avoid killing the pest's natural enemies. The predator *Eretmocerus haldemanii* has been introduced from Florida.

2872. Feldmesser, J., Rebois, R. V., and Taylor, A. L.
**Progress report on growth response of burrowing nematode infected citrus following chemical treatments under greenhouse conditions.**
*Plant Dis. Reptr*, 1959, **43**: 261-3, bibl. 3, illus.

In previous experiments the elimination of the burrowing nematode, *Radopholus similis*, from soil obtained from spreading decline areas in citrus groves has not resulted in eliminating the spreading decline symptoms from citrus seedlings grown subsequently in the same soil. In the experiment described here an attempt was made to eliminate fungi as a possible cause of symptoms without destroying the burrowing nematodes. Duncan grapefruit seedlings were grown for 2 months in soil infected with spreading decline, and seedlings that had become chlorotic were transferred to sterilized soil before receiving a captan drench. The treated plants became darker green than the control plants, and at a rate equivalent to 50 lb. captan per acre their root systems were twice as heavy as those of the control plants. Nematode counts for the treated and control plants were similar.—U.S.D.A., Orlando, Fla, and Beltsville, Md.

2873. Tarjan, A. C.
**Pressure injection of chemicals for possible systemic action against burrowing nematodes infecting citrus.**
*Plant Dis. Reptr*, 1959, **43**: 451-8, bibl. 11, illus.

An apparatus and method for pressure injection of chemicals into trees is described and illustrated. Eighty-nine Valencia orange trees infected with burrowing nematodes were injected with 38 formulations of 54 chemicals. Results are expressed in terms of nematodes surviving at intervals up to 12 weeks. Although some of the materials tested show promise as nematocides, extent of control appears to vary with fluctuation in nematode population during the sampling period. [Author's abstract.]—Fla agric. Exp. Stat., Lake Alfred.

### *Citrus—spray effects and residues.*

(*See also* 2917n, s, 2918g.)

2874. Deszyck, E. J., and Ting, S. V.
**Seasonal changes in acid content of Ruby Red grapefruit as affected by lead arsenate sprays.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 304-8, bibl. 10.

During a sampling period from August to January the acid content of fruit given a post-blossom spray of lead arsenate decreased by 30–40%, while in unsprayed fruit the decrease was about 25%. There was an inverse relationship between the average acid content of the fruit and rainfall during the sampling period. Lead arsenate sprays significantly reduced the acid content of grapefruit, but the degree varied with arsenate level and the season. The acid loss at 1·6 lb. lead arsenate per 100 gal. was more than twice that at 0·4 lb. per 100 gal. At 0·8 lb. per 100 gal. acidity was lowered by 13%, and this concentration is the maximum recommended for producing low acid fruit in mid-September.—Citrus Exp. Stat., Lake Alfred, Fla.

875. ATKINS, C. D., AND ROUSE, A. H.
**Effect of arsenic spray on the quality of processed grapefruit sections—with special reference to pectin.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 220-3, bibl. 7.

nalyses of canned Silver Cluster grapefruit
ctions showed no significant differences in keeping
uality that could be attributed to arsenic treat-
ent.—Fla Citrus Exp. Stat., Lake Alfred.

876. RIEHL, L. A., AND WEDDING, R. T.
**Relation of oil type, deposit, and soaking to effects of spray oils on photosynthesis in citrus leaves.**
*J. econ. Ent.*, 1959, **52**: 88-94, bibl. 18.

arious types of oil leaving known deposits were
pplied to potted, single-leaf, rooted stem cuttings
Eureka lemon and Bearss lime. No consistent
hibition of photosynthesis occurred with Cali-
rnia light-medium or medium grade spray oils
the deposit level of 150 µg. oil/sq. cm. of leaf
rface, an amount sufficient for the control of
alifornia red scale and citrus red mite. A definite
lationship between inhibition of photosynthesis
d increasing oil deposit was found in the deposit
nge of 300 to 600 µg. oil/sq. cm. of leaf surface;
e data, however, showed that the response to
all increments of oil would be slight. Recovery
photosynthesis occurred in less time in plants
eated with naphthenic oils than in those treated
h paraffinic oils. The principal effect on
otosynthesis occurs in the tissue of the leaf
arked by a dark discoloration known as oil
aking. Inhibition of photosynthesis in the
-soaked tissue, which is not killed, seems to be
e result of interference with gaseous exchange
used by the oil. Dissipation of the oil is accom-
anied by recovery of photosynthesis with a $\log_{10}$
lation to time. [From authors' abstract; for
milar work on transpiration effects see *H.A.*, 29:
27.]—Univ. Calif., Riverside.

877. RIEHL, L. A.
**Influence of water phase of oil spray on photosynthesis in Eureka lemon and Bearss lime leaves.**
*J. econ. Ent.*, 1959, **52**: 174-5, bibl. 3.

o real differences were apparent in the calculated
rcentage of inhibition of photosynthesis, whether
e 5 oils tested were applied directly or as aqueous
nulsions.—Univ. Calif., Riverside.

878. MCBRIDE, J. J., Jr.
**Reaction of zineb with copper compounds, oil deposits when applied with zineb, and deposits of zineb when applied with a variety of materials.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 118-22, bibl. 4.

he addition of copper compounds to zineb sprays resulted in the formation of copper ethylene-bis-dithiocarbamate and in a corresponding reduction in the deposit of the zinc compound. More oil was deposited from a combined zineb/oil spray than from an oil spray. The addition of lead arsenate, calcium arsenate or zinc sulphate plus lime to zineb sprays had no important effect on zineb residues.—Fla Citrus Exp. Stat., Lake Alfred.

2879. BLINN, R. C., AND OTHERS.
**Residual behaviour of various insecticides on and in lemons and oranges.**
*J. econ. Ent.*, 1959, **52**: 42-4, bibl. 3.

Magnitudes and persistence of chlordane, dieldrin, and heptachlor residues on and in lemons, and of malathion residues on and in Valencia oranges, are recorded. Persistence half-life values of these insecticides in the peel of the fruit are 19, 60, 23 and 32 days, respectively. Only negligible apparent residues were found in the edible portion of the fruit. [Authors' abstract.]—Univ. Calif., Riverside.

2880. JEPPSON, L. R., ELLIOTT, L. M., AND GUNTHER, F. A.
**Persistence of residues of Neotran on and in mature lemons and oranges.**
*J. econ. Ent.*, 1958, **51**: 914, bibl. 4.

The data here presented show that residues of Neotran (bis(*p*-chlorophenoxy)methane), which is very toxic to citrus red mite, have a half-life of 30 days for lemons and 39 days for oranges.—Univ. Calif., Riverside.

2881. MCBRIDE, J. J., Jr.
**Persistence of residues of 2,4,5,4′-tetrachlorodiphenylsulfone in Florida citrus fruits.**
*J. agric. Food Chem.*, 1959, **7**: 255-6, bibl. 3.

Residues of Tedion, which provides an effective control of red mite, were determined on all major varieties. It persisted in the peel for over 3 months, but absorption into the pulp and juice was extremely low.—Univ. Fla Citrus Exp. Stat., Lake Alfred.

### *Citrus—fruit composition and handling.*

(*See also* 2185, 2437, 2834, 2917b, f, p, 2918f.)

2882. TING, S. V., AND DESZYCK, E. J.
**Isolation of *l*-quinic acid in citrus fruits.**
*Nature*, 1959, **183**: 1404-5, bibl. 8.

The method is described. Contents found in the peel and flesh respectively, as mg./100 g. fresh weight, were: Pineapple orange 172 and 52; Marsh grapefruit 233 and 87; Dancy tangerine 206 and 27; Corregia lemon 161 and 18; Persian lime 209 and 146.—Fla Citrus Exp. Stat., Lake Alfred.

2883. JUTRAS, P. J., AND COPPOCK, G. E.
**Mechanization of citrus fruit picking.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 201-4, bibl. 14, illus., and *Citrus Ind.*, 1959, **40** (8): 7-9, bibl. 14, illus.

Five variations in picking citrus were tested, as follows: (1) elimination of the picking bag, (2) continuous removal of the fruit from the bag and elimination of ladder moving, (3) continuous removal of the fruit from the bag and elimination of the ladder, (4) elimination of bag and ladder, and (5) elimination of the picker. It is concluded that under present conditions a fruit picking aid could be developed to carry pickers to the grove, to position 2 or more of them in each tree, and to empty fruit into a truck serving several of these machines. Tree shaking shows promise for grapefruit harvesting. Mechanical harvesting would be easier from trees trained in narrow hedgerows.—Fla Citrus Exp. Stat., Lake Alfred.

2884. Greene, P. H., and Cook, P. H.
**Bulk handling at Mesa Citrus Growers.**
*Calif. Citrogr.*, 1959, **44**: 194-8, illus.

Containers used for citrus fruit are large, wirebound, wooden baskets carried on specially designed trailers (when sweating is required) or large bin trailers (which are used later in the season). The bin trailers are brought to the packing house, where the fruit is tipped by means of a hydraulic jack onto an apron, and then travels by conveyor belt for packing.

2885. Eaks, I. L.
**Brush effects on oranges.**
*Calif. Citrogr.*, 1959, **44**: 141, 143.

In trials with 4 washer brush types, used in combination with horsehair dryer brushes, all brushing treatments caused some injury to the fruit, but the degree of injury depended on the inherent susceptibility of the fruit and on the flexibility of the brushes. Increased brushing time on the washer brushes increased the amount of fruit injury in an experimental unit but not in a commercial unit.

2886. Deetlefs, J. du T.
**Waxing of citrus fruit.**
*Citrus Gr*, 1959, No. 301, pp. 1-4, bibl. 3.

In commercial trials several waxes were applied to Valencia oranges, and in general these resulted in better appearance and kept the fruit fresher and firmer. The lustre was retained for up to 3 weeks after discharge overseas. Waxing retarded the rate of respiration, but did not affect development of decay or stem-end browning. Emulsion waxes suppressed black spot development.

2887. Hatton, T. T., Jr.
**Some effects of waxes and 2,4,5-trichlorophenoxyacetic acid as postharvest treatments on Persian limes.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 312-15, bibl. 4.

Limes treated with 500 and 1,000 p.p.m. 2,4,5-T in wax and stored for 4 weeks at 50° F. retained more green colour than untreated limes when removed from storage or after an additional holding time of 2 weeks at 70° F. Similar results were obtained after 8 weeks at 50° F., but after this treatment the green colour of many treated limes was below the minimum commercial requirement. The amount of decay was not significantly different between treated and untreated fruits. No important difference could be detected in colour decay or weight loss of limes treated with 2 different waxes, regardless of 2,4,5-T treatment. Unwaxed limes treated with 2,4,5-T developed an undesirable mottled yellow-green appearance.—U.S.D.A. Miami.

2888. Yost, G. E., and others.
**Degreening citrus fruits in large pallet boxes**
*Citrus Mag.*, 1959, **21** (9): 10-11, bibl. 3 illus.

Differences in pack-out between fruit degreened in standard field boxes and in different types of pallet box were not significant. In pallet boxes stacked two high, differences between the fruit in the top and bottom boxes were not consistent. Only one type of degreening chamber was used in this study

2889. Grierson, W.
**Causes of low pack-outs in Florida packing houses.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71** 166-70, bibl. 12.

Preliminary results from a survey on the relative importance of factors causing low pack-outs of citrus fruit indicate that advances in the spray programme have reduced losses due to scale insects and possibly also to rust mites. Losses due to green fruit that failed to degreen were surprisingly high. Wind injury was responsible for nearly ⅓ of all the fruit that was down-graded. Losses due to melanose continued at a high level.—Fla Citrus Exp. Stat., Lake Alfred.

2890. Hatton, T. T., Jr., and Winston, J. R.
**Overseas ventilated shipping tests with Florida oranges and grapefruit.**
*Mktg Res. Rep. U.S. Dep. Agric.* **274**, 1958 pp. 20, 15 cents.

A detailed report is given of the shipment from Tampa and Jacksonville, Fla, to Holland late in the citrus season (March, April and May, 1957) of both Valencia oranges and Marsh Seedless grapefruit in ventilated, but mainly unrefrigerated, holds. Regardless of treatments used to inhibit decay all 4 orange shipments arrived in an unacceptable condition whereas oranges subjected to a semi-refrigerated treatment arrived in acceptable condition. Of the grapefruit only 1 out of the 5 consignments arrived totally unacceptable. Rind breakdown was the worst trouble experienced. The chemicals used for oranges were: (1) 2 sheets of biphenyl-treated paper (11×7 in.) per box, or (2) 2% sodium orthophenylphenate and 1% hexamine in a 3-minute dip followed by a rapid water rinse [treatment referred below as DH], or (3) a combination of the two. apefruit was treated with DH only. Of the atments for oranges biphenyl+DH was the most ective, followed by DH alone. The holding iod after receipt was responsible for a consider- e loss. The actual source of fruit was also found be important in relation to the extent of loss tained during the marketing period. The ssibility of pre-cooling oranges and grapefruit get lower temperatures during the first part of a seems worth investigating.

91. BERAHA, L., AND OTHERS.

**Factors influencing the use of gamma radiation to control decay of lemons and oranges.**

*Phytopathology*, 1959, **49**: 91-6, bibl. 2, illus.

adiation of lemons within the range of 150,000–,000 rep delayed rotting by *Penicillium digitatum* hout injury for about 12 days at 75° F. and days at 55° F. Unirradiated controls began rot after 3 days. A dose sufficient to kill the gus caused skin discoloration and softening of lemons. Much higher doses are required to rd old or established infections than young or ipient infections. A dose of 200,000 rep was imal for extending the shelf life of navel nges artificially inoculated with *P. italicum*. en held at 75° F., no decay or radiation injury eared within 20 days. Unirradiated controls rted to decay within 4 days after inoculation. 41° F. oranges remained in good condition even er (65 days) after 150,000–300,000 rep, whereas radiated controls showed infection after 15 s. The shelf life of lemons inoculated with *talicum* was extended to 15 days at 75° F. and days at 55° F. after 150,000 rep without injury, ereas unirradiated controls showed some decay hin 3 days. The development of *Alternaria* rot he stem (button) end of irradiated lemons and nges, and not in the unirradiated control fruit, icates that changes in irradiated fruit may dispose them to secondary decay. *A. citri* was re resistant to radiation than *P. digitatum* or *italicum*, both *in vitro* and *in vivo*. [For a liminary report of this work see *H.A.*, 27: 2809.] Agric. Mktg Serv., U.S.D.A., Chicago.

2. BUTLER, N. J.

**Storage rots of citrus fruits.**

From abstr. in *J. appl. Bact.*, 1958, **21** (2): v.

e commonest rots are: *Penicillium* rots (*P. digita-* and *P. italicum*); stem end rots (e.g. *Phomopsis Diplodia*), *Alternaria* rots (*A. citri*); and sour (*Oospora citri-aurantii*). The conditions which our the development of the commoner rots are: it of low vitality (e.g. stem end types, *Alternaria Botrytis*); mechanical injury (*Penicillium*, *lletotrichum* and *Oospora* in part); mature fruit *spora*, *Penicillium* and *Phomopsis*); and long rage (*Oospora*, stem end types, and *Alternaria*). ntrol measures during harvesting, transport and storage include minimizing injury, the use of antiseptic washes, fumigation, antiseptic impregnated wrappers, and observance of safe storage times and temperature. During marketing rapid distribution is aimed at, and, when rots have developed which spread by contact, it is necessary to repack and discard the affected fruit. Types which spread by contact are *Penicillium italicum*, *Oospora*, *Sclerotinia* and *Phytophthora*.—Galloway and Barton-Wright, London.

2893. EAKS, I. L., AND LUDI, W. A.

**Response of orange and lemon fruits to fumigation with ethylene dibromide effective against eggs and larvae of the oriental and Mexican fruit flies.**

*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 297-303, bibl. 9.

Respiration of lemon and orange fruits was stimulated by fumigation with ethylene dibromide. The degree of stimulation was proportional to the dosage level, and the average percentage stimulation ranged from 104 to 174. Increases in respiration were less with waxed fruits than with unwaxed fruits. Juice quality and button condition at the end of 4 weeks' storage following fumigation showed no difference between fumigated and control fruits.—Univ. Calif., Riverside.

2894. SINCLAIR, W. B., AND LINDGREN, D. L.

**Factors affecting the fumigation of food commodities for insect control.**

*J. econ. Ent.*, 1958, **51**: 891-900, bibl. 6.

This paper provides a detailed report on the effects of the physical and chemical properties of fumigant gases on insect control and on the physical and chemical responses of the fumigated material—citrus and avocado fruits—to the fumigation treatment. The various characteristics that go to make up a satisfactory fumigant are clearly and usefully enumerated.—Univ. Calif., Riverside.

### *Litchis*

2895. LYNCH, S. J.

**The effect of cold on lychees on the calcareous soils of southern Florida 1957-58.**

*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 359-62, bibl. 4, illus.

Both grove heaters and sprinkler irrigation treatments gave some frost protection in litchi groves and a nursery. Cambium injury was severe in a block of 3-year-old trees. Young trees raised from air-layers were killed back to the ground by cold and failed to sprout again; seedling trees of similar age and size showed 90% regrowth after freezing. Frost damage removed a high proportion of flowering wood from many bearing Brewster litchis, but a certain amount of blossom was produced abnormally.—Univ. Miami, Coral Gables.

2896. Young, T. W., and Noonan, J. C.
**Freeze damage to lychees.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 300-4, illus.

Some observations are made on frost temperatures which damage litchi trees of 5 years and older. In general, recurring cold induced heavier blossoming than might otherwise have occurred, thus compensating to some extent for damage to bearing wood. A trial (which is to be reported in detail elsewhere) on the effect of N source on cold tolerance is briefly reviewed.—Subtrop. Exp. Stat., Homestead.

### *Olives.*

(*See also* 2103, 2819, 2917a, g, k, y, z, 2918e, k.)

2897. Jacoboni, N.
Sull' importanza dell' anulazione preventiva delle talee nel nuovo metodo di propagazione dell'olivo mediante la nebulizzazione. (**The importance of previous ringing for the successful mist propagation of olives.**) [English summary ½ p.]
*Ann. Sper. agrar.*, 1958, **12**: 1533-56, bibl. 35, illus.

The author's trials show that mist propagation, when aided either by previously ringing the shoots to be used as cuttings or by treatment with growth substances, offers an excellent and rapid means of propagating olives. He describes the successful and inexpensive apparatus used and gives figures of results. The cuttings were struck during August to October under a screen at varying temperatures with mean maxima and minima of 43·05° C. and 19·6° C. in August, of 39·8° C. and 14·1° C. in September, and of 32·8° C. and 10·09° C. in October. The best results in the final production of plants were achieved with cuttings formed from suckers and the shoots of suckers, cuttings from ordinary shoots and twigs proving more difficult.—Ist. Colt. arbor., Univ. Perugia.

2898. Hartmann, H. T.
**Rootstock effects in the olive.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 242-51, bibl. 4.

Preliminary results from a long-term trial with 3 scion varieties and 12 rootstocks have already been reported [see *H.A.*, 29: 848]. Propagation of seedling stocks with distinctive dwarfing or vigorous characters is in progress.—Univ. Calif., Davis.

2899. Buchmann, E., Brès, C., and Prevot, P.
Diagnostic foliaire de l'olivier irrigué en Tunisie. (**Foliar diagnosis of irrigated olives in Tunisia.**)
*Oléagineux*, 1959, **14**: 163-73, bibl. 6, illus.

Leaf analyses were undertaken in connexion with a series of fertilizer experiments at Enfida. The sampling technique is described, and the contents of N, P, K, Ca, Mg found are shown together with yields from various NPK treatments. The critical levels for N, P and K, under these irrigated conditions, were found to be 1·75%, 0·095% and 1·20% respectively. It is pointed out, however, that the N: P balance is of importance, and that the critical level of either N or P depends on the content of the other element.

2900. Hartmann, H. T.
**Some responses of the olive to nitrogen fertilizers.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 257-66, bibl. 6.

In foothill soils of low natural fertility Mission olives responded markedly to N applications by increases in fruit set and in subsequent yields. The N levels in the trees were not, however, associated with inflorescence production or the percentage of perfect flowers. Reduced fruit size accompanied increased N levels as a secondary effect resulting from the increased numbers of fruits per tree. Increased levels of N retarded the rate of fruit maturity, but the oil content of the fruit was not associated with the N level of the tree. Unfertilized trees had significantly smaller leaves than those receiving N. Under more fertile soil conditions, less subject to leaching by rain, the responses of olives to added N were much less pronounced. After withholding N fertilizers for 3 years, leaf analyses showed the N level to be still within the normal range. Under these conditions no consistent immediate response in fruit set or yield was generally found.—Univ. Calif., Davis.

2901. Alekperova, M.
**The influence of irrigation regimes on the growth of olives.** [Russian.]
*Soc. S.-H. Azerbajdžana*, 1957, No. 4, pp. 29-32, from *Ref. Ž.* (*Biol.*), 1958, No. 6, Abstr. 25,161.

In young olive plants receiving inadequate irrigation extension growth was largely restricted to the main branches, whereas in plants receiving adequate water most growth occurred on the lateral shoots.

2902. Fahmy, I.
**Changes in carbohydrate and nitrogen content of Souri olive leaves in relation to alternate bearing.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 252-6, bibl. 7.

The leaf-N content was high during the winter preceding the on-year, dropped after fruit set in summer, and then increased to reach a high level in the summer of the following off-year. Leaf N was low in the winter preceding the off-year. During the period of flower development and fruit set leaf starch was significantly higher in the on-year as compared with the off-year. There was twice as much starch at the beginning of spring wth in the on-year as in the off-year. Increases he C: N ratio and in leaf starch were correlated. s concluded that the actual amounts of both N starch present in the leaves, rather than the N ratio, before and during spring growth could related to the irregular bearing habit observed Souri olives.—Amer. Univ. Beirut, Lebanon.

3. Lavee, S., and Spiegel, P.
**Spray thinning of olives with growth regulators.**
*Ktavim*, 1958, **9**: 129-38, bibl. 19.

raying NAA after fruit set caused a 25–35% rease in fruit size and a larger flesh: pit ratio. concentrations over 80 p.p.m. fewer partheno- pic fruit were produced. The optimum spraying iod was 6–18 days after full bloom. For the nzanillo variety a 60 p.p.m. concentration is essary when NAA is applied 6 days after full om, with an extra 10 p.p.m. for each subsequent . Lower concentrations are recommended for Suri variety. Yields were not reduced.

4. Loprieno, N., and Tenerini, I.
Metodo per la diagnosi precoce dell' occhio di pavone dell'olivo (*Cycloconium oleaginum* Cast.). **(A method for the early diagnosis of leaf spot in olives.)** [English and German summaries 10 and 14 lines respectively.]
*Phytopath. Z.*, 1959, **34**: 385-92, bibl. 8, illus.

e method consists of dipping the infected leaves, hich macroscopical symptoms of the disease are yet visible, into a water solution of NaOH (5%) ed to 50°–60° C.; on the leaves, in the areas ere the pathogen is present, dark spots appear. e method is useful for determining the right time pply fungicides. [From authors' summary.]— Ric. agrar. Soc. Montecatini.

5. Modugno Pettinari, C.
Primo contributo alle ricerche su *Cycloconium oleaginum* Cast. e. sul comportamento del parassita in oliveti del Lazio. **(First contribution to studies on *Cycloconium oleaginum* and on the behaviour of this parasite in olive groves in the Lazio region.)**
*Boll. Staz. Pat. veg. Roma*, 1957 (issued 1958), **15**: 215-39, bibl. pp. 4.

general, the disease in Italy is static from late ing to late September or mid-October. Fungi- al treatments applied during this period are not y wasteful, but may be harmful, particularly in weather. Winter outbreaks are favoured by ld, damp weather. Neutral bordeaux mixture at , gave complete control of light infections in both ing and autumn, without damage to the olive es, but at 1% the protection was not complete, at 3%, although the leaves were virtually injured, a delayed harmful action was evident on the flowers at fruit set. With autumn applications of bordeaux mixture at 1·5%, the neutral and alkaline liquids gave complete protection, but slight infection developed after using the acid form. In a further experiment, neutral 1·5% bordeaux mixture gave complete protection for at least 2 months in spring, and almost complete protection for an equal period in autumn. Where zineb was used, 3% of the leaves were infected in spring, with an average of 8 lesions per leaf, and 5% in autumn, with an average of 15 lesions, but the foliage in general was a richer green and more luxuriant than in the other treatments or the controls. Captan was considerably less satisfactory, with 3 times as much infection as zineb, but only $\frac{1}{10}$th as much as in the controls.

2906. Rambelli, A.
Ricerche sull'occhio di pavone in oliveti della collina romagnola. **(Leaf spot of olive on the slopes of Romagna.)**
Reprinted from *Progresso agric.*, 1958, **4**, pp. 8, illus.

Notes on the life-history of the parasite, *Cycloconium oleaginum*, are followed by a very brief account of trials carried out for 3 consecutive years on its control. These trials showed that the disease could be readily controlled by immediate spraying after spring or summer rain with bordeaux mixture at 1%, copper oxide at 0·4% or zineb at 0·35%. An organic mercury salt was ineffective.

2907. Orphanidis, P. S., and others.
La dureté de la surface du fruit de l'olive en corrélation avec l'intensité de l'attaque du *Dacus*. **(The hardness of the olive fruit surface as correlated with the intensity of *Dacus* attack.)**
*Ann. Inst. phytopath. Benaki*, 1958, **1** (n.s.): 223-8, bibl. 4.

After covering olive fruits with a synthetic resin spray (plus a sticker) no fly punctures in the skin were observed, whereas there were many in the skin of untreated fruits.

2908. Orphanidis, P. S., and others.
Recherches expérimentales sur l'attractivité exercée par certaines substances proteinées sur le *Dacus* adulte de l'olive. **(Experimental studies on the attractiveness of certain proteins to the adult olive fly.)**
*Ann. Inst. phytopath. Benaki*, 1958, **1** (n.s.): 171-98, bibl. 12.

Seven protein materials, added to sulphate of ammonia, were 3 to 12 times more effective as baits for *Dacus oleae* than sulphate of ammonia. In general, their ability to attract lasted for 20 to 30 days. When protein materials were added to malathion branch sprays, significantly better control of olive flies (compared with malathion alone) was obtained with Staley's bait No. 7, and this effect was improved by adding 5% sugar and 1·5% Aquacel No. 207 (a hygroscopic material). Aquacel No. 207 did not increase the attraction of casein or brewers' yeast (Fix). Several factors affected the action of baits; under conditions of low humidity their efficiency was reduced, but it could be restored by placing the protein materials in a humid medium.

2909. Orphanidis, P. S., and others.
Recherches expérimentales sur l'action immédiate et résiduelle exercée par quelques insecticides phosphorés sur le *Dacus* adulte de l'olive. **(Experimental studies on the immediate and residual effect exerted by some phosphorus insecticides on the adult olive fly.)**
*Ann. Inst. phytopath. Benaki*, 1958, **1** (n.s.): 199-218, bibl. 2.

The residual action of Rogor L continued to be statistically significant for 30 days after spray application; parathion, malathion and Diazinon were much less persistent. Diazinon gave the most effective initial control of olive flies.

2910. Russo, G., and Santoro, R.
Osservazioni bio-ecologiche ed esperimenti di lotta antidacica eseguiti in Ascea Marina (Salerno) nel 1956. **(Bio-ecological observations and experiments on the control of the olive fly, carried out at Ascea Marina (Salerno) 1956.)** [English summaries ¾ and 1¼ pp.]
*Ann. Sper. agrar.*, 1958, **12**: 1191-1204, 1355-85.

The infestation during the hot, dry summer was not severe. The effectiveness of 0·03% parathion emulsion against the olive fly was increased, and residues in the oil were decreased, by adding 0·1% of copper sulphate to the solution. Diazinon at 0·1% gave good results, but was not enhanced in action by the addition of copper sulphate. The application of emulsifiable DDT at 0·15% at the end of June gave very good control, lasting at least until late September and leaving scarcely a trace of residue in the oil. By increasing the concentration in the first of 3 parathion treatments from 0·03% to 0·5%, control of the pest was improved without increasing the residue in the oil. There was little difference in results between normal and low-volume spraying with either DDT or parathion. Dusting with parathion was less effective than spraying. Rogor L (the N-monomethylamide of O,O-dimethyldithiophosphorylacetic acid) sprayed in mid-October gave unsatisfactory results below 0·06%, and remained active for only 4 weeks. It was even less effective in the form of dust. Dipterex was also unsatisfactory at concentrations of 0·04–0·08%. [For previous year's work see *H.A.*, 28: 1831.]—Lab. Ent. agrar. "F. Silvestri" Portici.

2911. Boselli, F.
Studi ed osservazioni sulla lotta antidacica in Sardegna. Possibilità d'impiego del parathion con eliminazione dei residui in eccesso nell'olio. **(Studies and observations on olive fly control in Sardinia. Possibilities of using parathion with reference to the elimination of excessive residues in the oil.)** [English summary ½ p.]
*Ann. Sper. agrar.*, 1958, **12**: 1411-36.

Parathion residues of more than the officially tolerated 1 p.p.m. in olive oil are rarely accumulated from high-volume spraying, and can be avoided in low-volume treatments by keeping the volume of solution per tree, and thus the amount of active parathion per tree, as low as is consistent with pest control. Data from several localities show that little or no residue persists where the total amount of active parathion is below 6 g. per tree in one season, but residues of more than 1 p.p.m. may be present where the dose per tree reaches approximately 7 g. To use Rogor L, another phosphoric ester, as an alternative to parathion, would be uneconomic.—Osserv. Mal. Piante, Cagliari.

2912. Tominić, A.
Toksikološka ispitivanja parationa i diazinona na maslinovoj muhi. **(Studies on the toxic effect of parathion and Diazinon on the olive fly (*Dacus oleae*).)** [English summary 1½ pp.]
*Zasht. Bilja*, 1957, No. 43, pp. 55-69, bibl. 12.

The residual toxicity of phosphoric ester preparations against *D. oleae* was tested on fruits of the wild olive and of 3 cultivated varieties. In the case of the wild olive soaking the fruits at the beginning of September in solutions of E 605 forte (parathion) at 0·92, 0·46 and 0·23 p.p.m. active principle, and then submitting them to attack by the olive fly, gave protection for 32, 25 and 17 days, respectively. With Basudin (Diazinon) at 0·6 and 0·4 p.p.m. the figures were over 32 and 27 days, respectively. In similar tests on the varieties Oblika and Levantinka, the effects of the insecticides were more lasting on the latter, which is smaller and contains less oil. On this variety 0·4 p.p.m. Diazinon was still lethal after 40–50 days; parathion remained effective for a shorter time. When the tests were carried out in October, the lethal period increased to over 50 days in fruits of the wild olive. The development of resistant strains of olive fly is considered possible.

2913. Ortega Nieto, J. M.
Elaboración fraccionada de aceite de oliva con aprovechamiento del orujo. **(Fractionated elaboration of olive oil, utilizing the marc.)**
*Bol. Oleic. int.*, 1958, **8** (45): 9-21.

Percentages of oil, pulp and stone are stated for 20 ve varieties from several localities in Spain. rther details, including water, oil and dry-matter ntents of the pulp, stone and seed, are given for variety Picual. The oil content of the marc left er the first extraction varied with the variety and ndition of the fruit, but averaged 12·88%. llowing preliminary attempts to recover as much possible of this, the following procedure was olved. The stones were separated from the pulp d crushed just sufficiently to extract the seeds ole. The fragments measuring 3–4 mm. were ved out and added with the seeds to the pulp, whole mass being pounded before the second essing. The oil from this second operation was ore acid than that from the first. The exhausted lp was pressed into cake and used as cattle od after 7 months' successful storage. The stone gments can be stored indefinitely, or can be htly carbonized and sold as fuel. The fractiona- n process has not yet been developed on a mmercial scale.

14. François, M. T., and Heinrich, S.
**Characteristics of olive kernel oil obtained by different processes.** [French?]
*C.R. Acad. Sci., Paris*, 1958, **247**: 222-5, from abstr. in *J. Sci. Food Agric.*, 1959, **10**: i-104.

e belief in the deleterious effect of olive kernel oil plicit in the preference for first pressing oil has er been tested. Oil obtained from pressing the rnel, divided into cold first pressing, second essing at 60–70° C. (containing 3% of crushed ll), and a light-petroleum extract of the residual e, together with an ethanol extract of shell-free ound kernel, were compared, using new and e-year-old seeds. The older seeds gave a lower yield which was of high acid value. The first essings and the ethanol extracts of fresh kernels ve oils comparable with first quality olive oil. utine examination showed them to be suitable edible oils without further refinement.

### *Tung.*

15. Shear, C. B.
**Responses of tung trees in sand and soil cultures to ratios of ammonium to nitrate nitrogen and levels of potassium and zinc.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 224-39, bibl. 21.

sand cultures all the aspects of growth measured re reduced by increasing the ratio of ammonium nitrate N. In soil only tree weight was affected the ammonium/nitrate ratio, being heaviest at ammonium to ⅔ nitrate. An increased supply of resulted in increased growth of the trees and in higher percentage of oil in the fruit in both bstrates, and it also increased yields in sand ltures. Increasing levels of applied Zn decreased owth, yield and oil content of the fruit of the ees in sand, but had no significant effect on soil-grown trees. Leaf contents of N, P, K, Ca, B, Cu, Fe and Mn were affected similarly in both substrates. Increasing the ammonium/nitrate ratio had a more depressing effect on the leaf content of Mg in sand-grown than in soil-grown trees. Identical levels of Zn induced much higher leaf-Zn contents in the sand-grown trees than in the soil-grown trees. It is concluded that by relating tree responses to leaf composition rather than to levels of nutrients applied the results from sand cultures can be applied to soil-grown trees.—U.S.D.A., Gainesville, Fla.

2916. Large, J. R.
**"Big bud" of tung, a genetic variation.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 323-4, bibl. 1, illus.

Big bud is characterized by enlarged buds and stems, shortened internodes, and the development of numerous enlarged adventitious buds. Big buds placed in healthy seedlings grew out to show a typical big bud condition, while the stock continued to grow normally.—Fla agric. Exp. Stat., Monticello.

### *Noted.*

2917.

a de Almeida, F. J.
Posibilidades y limitaciones de la selección y mejora del olivo. (**Possibilities and limitations of selection and improvement of olives.**)
*Bol. Oleic. int.*, 1958, **8** (45): 31-5, bibl. 5.
A review.

b Anon.
**Handling [citrus].**
*Citrus News*, 1958, **34**: 112-13, illus.
Successful use of 90-bushel bulk bins for orange harvesting in Australia.

c Anon.
**The citrus fruit industry of Dominica.**
*Windward Is Annual*, 1956, pp. 34-6, illus.
A short historical account.

d Atkins, E. L., Jr.
**Biology, control of orangeworms.**
*Calif. Citrogr.*, 1959, **44**: 165-71, bibl. 9.
Notes on life histories and control of 10 lepidopterous pests.

e Bazán de Segura, C.
Hongos controladores de la mosca blanca y queresas de los cítricos. (**Fungi controlling white fly and scale insects of citrus.**)
*Bol. trim. Exp. agropec. P.C.E.A. Lima*, 1958, **7** (2): 12-14.
Observations on the biological control of *Aleurotrachelus floccosus*, *Lepidosaphes beckii* and *Chrysomphalus aurantii*.

f BISSETT, O. W.
**Processing freeze-damaged oranges.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 254-9, bibl. 12.
With data on juice yields and characteristics.

g DE LA BORBOLLA Y ALCALÁ, J. M. R., AND OTHERS.
Consideraciones sobre la primera fase de la fermentación de las aceitunas verdes. (**Considerations on the first phase of fermentation of green olives.**)
*Bol. Oleic. int.*, 1958, **8** (45): 23-9, bibl. 4.
Micro-organisms, fall of pH, and effects of carbon dioxide.

h BOYCE, A. M.
**Avocado research at C[itrus] E[xperiment] S[tation].**
*Calif. Citrogr.*, 1959, **44**: 76, 88-93, 134-7.
Projects on avocado breeding, culture, pests and diseases reviewed.

i COIT, J. E.
***Carob culture in California.***
Publ. by Dr. J. Eliot Coit, Vista, Calif., 1958, pp. 5.
Notes on propagation, culture and uses, etc.

j COOK, P. H.
**Preventing avocado root rot.**
*Calif. Citrogr.*, 1959, **44**: 215-16.
Hot-water sterilization of avocado seed against *Phytophthora cinnamomi*.

k DEMAY, J.
Mise au point d'un procédé industriel de décorticage des noyaux d'olives et de séparation des amandons. (**Improvement of an industrial process for the decortication of olive stones and the separation of the kernels.**)
*Oléagineux*, 1959, **14**: 243-6, illus.
Preparatory to extracting the seed oil.

l DŽANGURAZOV, F. H.
**Subtropical fruits in the Tupolang Basin (Western Gissar).** [Russian, with Tadžik summary.]
*Izv. Otd. estestv. Nauk AN TadžSSR*, 1957, No. 18, pp. 89-101, bibl. 15, from *Ref. Ž. (Biol.)*, 1958, No. 5, Abstr. 20,531.
Figs, jujubes, persimmons and pomegranates.

m FLANDERS, S. E.
**The employment of exotic entomophagous insects in pest control.**
*J. econ. Ent.*, 1959, **52**: 71-5, bibl. 28, illus.
Collection, establishment and effectiveness of natural enemies, mainly of citrus pests.

n GUNTHER, F. A., BLINN, R. C., AND BARKLEY, J. H.
**Infrared procedure for quantitative determination of residues of 2,4,4′,5-tetrachlorodiphenyl sulfone (Tedion) on and in citrus fruit peel.**
*J. agric. Food Chem.*, 1959, **7**: 104-5, bibl. 9.

o HUFF, P. B.
**Damage to citrus by fluorine air pollution in central Florida.**
*Citrus Ind.*, 1959, **40** (3): 12-16, 33, bibl. 1, illus.
Observations on damage due to F from phosphate factories.

p HWANG, C.-C.
**A conclusive study on the effects of 2,4-D and its related chemicals on citrus.** [Chinese, with English summary ¾ p.]
*J. agric. Ass. China*, 1958, No. 23, pp. 58-64, bibl. 35.
Work on 2,4-D, 2,4,5-T and 2,4,5-TP in California and Florida reviewed.

q JARAMILLO, A.
El cultivo de la curuba. (**The cultivation of *Passiflora* spp.**)
*Agric. trop. Bogotá*, 1958, **14**: 712-17, illus.
Marcotting, layering, and disease-control problems. [See also *H.A.*, 28: 822p, 3026y.]

r KAPANADZE, I. S.
**The somatic initiation of polyploid forms in citrus.** [Russian.]
*Soobšč. AN Gruz SSR*, 1956, **17**: 645-8, from *Ref. Ž. (Biol.)*, 1958, No. 6, Abstr. 25,196.
The mechanism discussed.

s KOETHER, B.
**Determination of diphenyl in citrus fruits.** [German?]
*Z. LebensmittUntersuch.*, 1958, **108**: 158-63, bibl. 11, from abstr. in *J. Sci. Food Agric.*, 1959, **10**: i-154.

t KROME, W. H.
**Observations on cold damage to avocados in Dade County.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 339-41.
Degree of damage and protection by heaters.

u LEDIN, R. B.
**Cold damage to fruit trees at the Sub-tropical Experiment Station, Homestead.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 341-4.
Damage to different species recorded.

v LEE, B. W.
***Phytophthora* control for citrus replants.**
*Calif. Citrogr.*, 1959, **44**: 251-2.
Hot-water treatment of seeds and seedlings, and soil disinfection with Vapam and Mylone.

w LEVITT, E. C.
**Heavy "drop" of citrus fruit.**
*Agric. Gaz. N.S.W.*, 1958, **69**: 544-6, illus.
Factors causing excessive fruitlet drop discussed.

x McCLEAN, A. P. D., MARLOTH, R. H., AND ENGELBRECHT, A. H. P.
**Exocortis in South African citrus trees.**
[Afrikaans and French summaries ½ p. each.]
*S. Afr. J. agric. Sci.*, 1958, **1**: 293-9, bibl. 10, illus.
Presence demonstrated in several varieties.

y MEAKINS, G. D., AND SWINDELLS, R.
**The structures of two acids from olive leaves.**
*J. chem. Soc. Lond.*, 1959, pp. 1044-7, bibl. 5.
Identified as 10: 16-dihydroxyhexadecanoic and 9: 10: 18-trihydroxyoctadecanoic acids.

z MESA BERNAL, D., AND VALENZUELA SAMPER, G.
El cultivo del olivo. Factores importantes de carácter agronómico para el buen éxito del cultivo. **(Olive growing. Important cultural factors for success of the crop.)**
*Agric. trop. Bogotá*, 1958, **14**: 121-4, 285-95, illus.
The first section deals with soils and manuring, the second with climate [see also *H.A.*, 28: 3027d].

8.

a MUMA, M. H., AND CLANCY, D. W.
**A purple scale parasite new to Florida citrus.**
*Citrus Mag.*, 1959, **21** (8): 18, illus.
*Aphytis lepidosaphes* found to be parasitizing up to 56% of scale insects in some groves.

b NAURIYAL, J. P., SHANNON, L. M., AND FROLICH, E. F.
**Eureka lemon–trifoliate orange incompatibility.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 273-83, bibl. 21, illus.
A fuller account of the work abstracted in *H.A.*, 29: 791.

c NORMAN, E. J.
**The feeding of frost damaged trees.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 332-3.
General advice on the nutrition of subtropical trees.

d PRUTHI, J. S., AND LAL, G.
**Chemical composition of passion fruit (*Passiflora edulis*, Sims.).**
*J. Sci. Food Agric.*, 1959, **10**: 188-92, bibl. 25.
Including ascorbic acid and carotene at different maturity stages.

e REICHERT, I., AND GALUN, M.
**Some lichens on olive trees in Israel.**
*Bull. Res. Coun. Israel, Sect. D*, 1958, **6D**: 237-46, bibl. 8, illus.
Nineteen species and varieties from 9 genera are described.

f SARKAR, S. R.
**Vitamin-C content of citrus fruits in Darjeeling area.**
*Indian J. appl. Chem.*, 1958, **21**: 92-4.

g SINGLETON, G.
**The use of arsenic on citrus fruit for processing. A review.**
*Proc. Fla St. hort. Soc., 958*, 1959, **71**: 262-5, bibl. 28.

h SPENCER, H., AND SELHIME, A. G.
**Experiments with Kelthane for the control of citrus red mites.**
*Citrus Mag.*, 1959, **21** (8): 22, bibl. 5.
See *H.A.*, 28: 793.

i THULLBERY, H. A., AND LONG, W. T.
**Observations of varieties and rootstocks used in the Indian River Area.**
*Citrus Mag.*, 1959, **21** (7): 33.
Growers' opinions of rough lemon and Cleopatra mandarin as stocks for various oranges and grapefruit.

j WHELCHEL, H.
**Observations of the effect of cold on limes in Dade County.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 348-9.
And notes on protection by windbreaks and sprinkler irrigation.

k ZACHOS, D. G.
**A spotting of olive fruits caused by *Pseudomonas savastanoi* (E. F. Smith) Stevens.**
*Ann. Inst. phytopath. Benaki*, 1958, **1** (n.s.): 159-70, bibl. 17, illus.
Bacterium enters fruit by the lenticels; infection likely to be most severe in rainy seasons.

# TROPICAL FRUIT AND PLANTATION CROPS.

## *General.*

(*See also* 3099, 3100, 3107, 3109.)

2919. Philipp, P. F.
**Hawaii's problems and many assets.**
*Yearb. Agric. U.S. Dep. Agric. 1958*, 1958, pp. 440-8.

The largest agricultural industry in the islands is the growing and processing of sugar cane. In 1956 about 221,000 acres were under cane, the largest single plantation being 27,700 acres, the smallest 600 acres. Notes are given on how the land is used for sugar production and also for the second most important crop, viz. pineapples. The acreage under pineapples, ranging from sea level to 2,000 ft, was 77,000 in 1956. Other crops of considerable importance include coffee, macadamia nuts, papaws, bananas and passion fruit. Tobacco, rubber and sisal have been tried on a commercial scale but found uneconomic.

2920. Morales, J. O., and others.
**Puerto Rico: change and progress.**
*Yearb. Agric. U.S. Dep. Agric. 1958*, 1958, pp. 449-57.

The 3 main crops, sugar cane, coffee and tobacco, are grown on almost ⅔ of the cultivated land. The remaining ⅓ is devoted to forage crops, starchy vegetables, fruits, cereals and other crops. The use of the land and the income contributed by these and other crops are considered.

2921. I.N.É.A.C.
Normes de main-d'oeuvre pour les travaux agricoles au Congo belge. (**Labour standards for agricultural tasks in the Belgian Congo.**)
*Publ. Inst. nat. Étude agron. Congo belge*, 1958, pp. 204, bibl. 35, 100 f.

This valuable compilation deals with the manpower requirements of about 20 crops, including the chief tropical plantation crops, the work under each being subdivided according to the needs of the crop. For each operation the number of man-days per ha. and the daily task of an individual labourer are stated, and also, where applicable, the number of times the operation should be performed each year.

2922. Peters, F. E.
La composition chimique des aliments du Pacifique Sud. (**The composition of South Pacific foods.**)
*Qual. Plant. Maveg.*, 1959, **5**: 313-43, bibl. 31.

Quantitative analytical data on nutrient values are included for the roots [rhizomes?] of the fern *Pteris moluccana*; the rhizomes and tubers of the non-fruiting banana *Musa paradisiaca* var. *sapientum oleracea* and of Polynesian arrowroot (*Tacca leonpetaloides*), *Colocasia esculenta*, *C. antiquorum*, *Xanthosoma sagittifolium* and *Cyrtosperma chamissonis*; the stem pith of the sago palm (*Metroxylon sagu*) and the sap of *Nipa fruticans*; the fruit of breadfruit (*Artocarpus utilis*), a mangrove (*Bruguiera eriopetala*), papaw (*Carica papaya*), rose-apple (*Eugenia jambos*), New Caledonian fig (*Ficus racemigera*) and screw pine (*Pandanus* spp.); the Tahitian chestnut (*Inocarpus edulis*), coconuts and *Pandanus* nuts; the leaves of bamboo, pumpkin *Dammaropsis kingiana*, *Gnetum gnemon*, *Hibiscus manihot*, another mangrove (*Lumnitzera racemosa*) *Sesbania grandiflora*, New Zealand spinach (*Tetragonia expansa*), *Wedelia biflora*, *Colocasia esculenta* and *Manihot dulcis*; the pods of *Phaseolus lunatus* and the fructifications of certain fungi.

2923. Anon.
**Warm-blooded animals.**
*Plant. Bull. R.R.I.M.*, 1959, No. 41, pp. 38-41, illus.

Control measures are outlined for animals which cause damage in rubber estates. These are elephants, monkeys, deer, pigs, rats, squirrels porcupines, shrews and bats. Fencing, trapping and poison baits are the common methods.

## *Bananas.*

(*See also* 2437, 3069u.)

2924. Oppenheimer, C., and Gottreich, M.
**Studies on growth and development of the dwarf banana in the coastal plain of Israel IV. Comparative value of planting materia from different mother orchards.**
*Ktavim*, 1958, **9**: 35-42, bibl. 1.

Planting material from light soil areas produced plants which flowered earlier and gave lower yields than that from heavy soil. Suckers from medium textured soils are recommended. There was no difference between plants taken from 2- or 3-year-old plantations. [For Parts I, II and III, see *H.A.* 25: 4345.]

2925. Nagpal, R. L., Gupta, P. K., and Phadnis N. A.
**Effect of planting during different seasons on the growth and yield of Basrai banana.**
*Poona agric. Coll. Mag.*, 1958, **49**: 49-68 bibl. 9.

Bananas planted in March/April made better growth and gave higher yields than those planted later, up to December. Flowering occurred in less than 300 days after planting in March/April. Growth, flower bud differentiation and fruit development were adversely affected in months when the average temperature was below 75° F. Sprouting of rhizomes was inhibited when the monthly average maximum temperature went above 98° F. Six-month-old rhizomes were better nting material than 2-month-old rhizomes. uits from rhizomes planted in April took 2 weeks ger for development than those planted in May, ne or July.

26. Lorch, J.
**Analysis of windbreak effects.**
*Bull. Res. Coun. Israel, Sect. D*, 1958, **6D**: 211-20, bibl. 35, illus.

cent work on the effects of windbreaks is tically examined, in particular that on artificial d natural windbreaks in Jordan Valley banana ntations. Explanations based on reductions in nspiration are rejected, and it is concluded that minimizing of leaf damage by the windbreaks the major factor in increasing yields.—Hebrew niv., Jerusalem. H.L.

27. Page, O. T.
**Observations on the water economy of *Fusarium*-infected banana plants.**
*Phytopathology*, 1959, **49**: 61-5, bibl. 14.

imbalance in the water economy of banana nts infected with *Fusarium oxysporum* f. *cubense* s demonstrated. Weight loss due to transpiran, and volume of aqueous tracheary exudate re less in diseased plants than in healthy plants. duced transpiration in laminae occurred in vance of external symptom expression. Flow e was slower through dysfunctional vessels than ough healthy vessels. Although it cannot be cluded that a water shortage resulting from cheal obstruction is the only cause of an imanced water economy, an important adjunctive e is ascribed to vessel dysfunction in the panama ease syndrome. [Author's summary.]—Vining Dunlap Labs, Tela Railroad Co., La Lima, nduras.

28. Calpouzos, L., and others.
**Studies on the action of oil in the control of *Mycosphaerella musicola* on banana leaves.**
*Phytopathology*, 1959, **49**: 119-22, bibl. 10, illus.

raying banana plants with either Orchard Spray ls Nos. 35 and 40, pharmaceutical mineral oil, Silicone 555 gave complete control of sigatoka ease (*Mycosphaerella musicola*=*Cercospora sae*), probably by antifungal action inside the ves. These substances failed to inhibit germinan of conidia and ascospores of the fungus or its netration into the stomata to a degree which uld explain the control obtained.—Federal Exp. at., U.S.D.A., Mayaguez, P.R.

29. Price, D.
**Emulsion sprays against leaf spot disease of bananas.**
*Commonw. phytopath. News*, 1958, **4**: 63.

controlling *Mycosphaerella musicola* by the use of gal. pure oil per acre applied with motor driven apsack machines the oil may be phytotoxic. By using a 60% oil in water emulsion, with Triton X114 or Ethylan CP as an emulsifier, good coverage and control were obtained without causing injury. [See also *H.A.*, 28: 4054.]—Cameroons Develop. Corp.

2930. Butler, N. J.
**Microbiological aspects of banana transport.**
From abstr. in *J. appl. Bact.*, 1958, **21** (2): v-vi.

Many organisms produce wastage, but only two are of serious consequence on bananas imported into Great Britain and Europe, viz. *Thielaviopsis paradoxa* and *Gloeosporium musarum*. Both these organisms are wound parasites. *T. paradoxa* will develop on green fruit, grow rapidly at 53° F., and produce stalk rot, stem rot and finger dropping, and fruit rot. *G. musarum* only develops on ripening fruit as it requires sugar for development, is slow developing at 53° F., and produces stem rot with finger dropping and anthracnose scarring of the fruit. Control measures to reduce injury comprise careful handling and packing the stalks in individual polythene bags; sealing fresh cut stalk ends to control stalk rot; and rapid cooling to 53° F. and rapid delivery from the plantation to the ship to avoid the development of high temperature organisms.—Galloway and Barton-Wright, London.

2931. Tager, J. M.
**Isolation of mitochondria from ripening bananas.**
*S. Afr. J. Sci.*, 1958, **54**: 324-6, bibl. 6.

Banana pulp has a low pH and a high buffering capacity and contains material that precipitates proteins. Mitochondria were nevertheless isolated from banana pulp at various stages of ripening by incorporating sufficient dipotassium phosphate into the homogenizing medium to bring the pH of the final homogenate to neutrality, and by adding inert protein to the homogenizing medium. The mitochondria were able to oxidize citrate, α-ketoglutarate, succinate and malate, but not pyruvate. [From author's abstract.]—Plant Physiol. Res. Inst., Univ. Pretoria.

### *Cacao.*

(*See also* 3068o, q, 3069d, l, v, 3098.)

2932. West African Cocoa Research Institute.
***Annual Report of the West African Cocoa Research Institute, 1957-58,*** Tafo, 1959, pp. 79, illus., 5s.

Progress is reported on research on the following subjects: *Plant Pathology:* Studies on the relative susceptibility to virus infection of Amazon and Amelonado varieties; coppiced cacao has shown much masked virus infection in apparently healthy trees; work on the use of mild virus strains to protect trees from more severe viruses; major black-pod epiphytotics probably result mainly from spore rather than systemic infections; susceptibility to black pod varies consistently between selections; a number of minor cacao diseases are being investigated in addition to the above. *Entomology:* Control of mealybugs by destruction of attendant ants; 2 dieldrin applications reduced mealybug populations to very low levels for over a year, but no effect on swollen-shoot incidence was observed; capsid control experiments indicated that endrin was most effective and gamma-BHC better than aldrin; the use of routine sprays, especially of dieldrin, apparently increased pod miner incidence, but no reduction in pollination rates has been observed. *Agronomy:* Amelonado cacao gave the highest yield spaced at 7½×7½ ft. *Botany:* An Amelonado ×Upper Amazon hybrid gave the equivalent of over 1,400 lb. dry cocoa per acre in its fourth field year; considerable natural pollination has been observed to occur across 5 or 6 rows of trees; P uptake from the soil reached a maximum in June and then fell to a minimum in March, but the rate of uptake was not apparently related to crop development; experiments with gibberellic acid are in progress. *Chemistry:* In a shade and manurial trial on Amelonado cacao NPKMg applications increased the yield from 600 lb./acre in the control to 850 lb./acre; removal of shade alone increased the yield to 1,000 lb./acre, and fertilizers plus shade removal brought the yield to 1,600 lb./acre; work on a simplified fermentation technique using trays is giving encouraging results; a germination inhibitor has been found in cacao bean pulp.

2933. NAUNDORF, G.
Kakaoforschung in Kolumbien. (**Cacao research in Colombia.**)
*Gordian*, 1958, Vols. **57** and **58**, Nos. 1378 to 1386, pp. 2 or 3 in each number, bibl. 96, illus.

This series of articles deals with many aspects of cacao growing and research in Colombia, including the decline of the crop and its rehabilitation, areas and varieties, propagation by cuttings, physiology of germination, manuring, chemical weed control, effects of hormones, flowering and pollination, water uptake, cherelle wilt, *Monilia* disease (*M. roreri*), *Phytophthora* disease (*P. palmivora*), anthracnose (*Colletotrichum theobromicolum*), witches' broom (*Marasmius perniciosus*), blue rot (*Ceratostomella fimbriata*), various pests and their control, and finally selection.

2934. NAUNDORF, G.
Pflanzenhormon-Anwendung beim Kakao. (**Uses of plant hormones in cacao.**)
*Gordian*, 1959, **58** (1395): 12-14, (1396): 10-11.

This review is concerned particularly with the rooting of cuttings, the treatment of surgical wounds following black pod infection, the prevention of flower drop and the control of weeds.

2935. KOWAL, J. M. L.
**The effect of spacing on the environment and performance of cacao under Nigerian conditions. I. Agronomy.**
*Emp. J. exp. Agric.*, 1959, **27**: 27-34, bibl. 4.

An experiment designed to compare the effects of 7 spacings on the growth and performance of Trinitario and Amelonado cacao types was carried out near Ibadan, Nigeria, on typical good cacao soil, during the period 1941–56. Although the results are obscured by heavy capsid infestation and a serious defect in the design, the following conclusions can be drawn: Density of stand profoundly affected establishment, ease of management, early yields, health and performance. Differences in vigour and behaviour between Amelonado and Trinitario were noted. The optimum tree density for Amelonado-type cacao was found to be about 800 per acre, while Trinitario required at least 1,000 per acre for optimum yields. The minimum density required for economic yields appears to be about 580 per acre. The average number of pods and the average weight of wet beans per tree increased with the decreasing stand density, but not sufficiently to increase the yield per acre at lower densities. [Author's summary.]—West. Reg. Dep. Agric., Ibadan.

2936. KOWAL, J. M. L.
**The effect of spacing on the environment and performance of cacao under Nigerian conditions. II. Ecological factors (soil moisture, soil nitrates, shade, and micro-climatic conditions).**
*Emp. J. exp. Agric.*, 1959, **27**: 138-49, bibl. 9.

A comparative study of cacao at different stand densities and of an adjoining area of secondary forest has been made, with special reference to soil moisture, soil nitrates, shade and micro-climatic conditions. The level of soil organic matter and plant nutrients was higher, and the physical condition of the soil better, under the forest than under cacao. A high positive correlation was found between stand density and soil moisture, soil nitrates, organic litter, soil nutrient status, and the yield of cacao. The pattern of soil nitrate fluctuations under forest growth and under cacao at various stand densities, in relation to season, was quite different from that usually occurring under exposed soil conditions. The level of soil nitrates throughout the year was positively correlated with stand density. [From author's summary.]—West. Reg. Dep. Agric., Ibadan.

2937. CUNNINGHAM, R. K.
**A review of the use of shade and fertiliser i the culture of cocoa.**
*Tech. Bull. W.A.C.R.I.* **6**, 1959, pp. 15, bibl. 38.

Earlier work in these fields is reviewed, especially that in Trinidad and the Belgian Congo. Difficul s, mainly due to the heterogeneity of planting aterial, are stressed, and it is admitted that no liable results could be obtained in West Africa ior to 1956, owing to capsid and virus damage. nce then, however, a preliminary large-scale field periment has shown an increase of 75% in the eld of 10-year-old Amelonado cacao following e removal of shade trees. The results of the first ase of revised fertilizer trials gave yield increases 41% under shade and of 45% without shade om a N, P, K, Mg (Ca, S) mixture, consisting of 3 lb. N as urea and $(NH_4)_3P_2O_5$, 120 lb. $P_2O_5$ as ngle and triple supers, 90 lb. $K_2O$ as $K_2SO_4$, and lb. MgO as $MgSO_4$ per acre per annum. [See so *H.A.*, 28: 4063 and 29: 1982k.] H.L.

38. Saunders, L. G.
**Methods for studying *Forcipomyia* midges, with special reference to cacao-pollinating species (Diptera, Ceratopogonidae).**
*Canad. J. Zool.*, 1959, **37**: 33-51, bibl. 8, illus.
**The pollination of cacao.**
*Cacao*, 1958, **3** (15): 1-4, bibl. 6.

he known pollinators of cacao are shown to elong to the subgenera *Proforcipomyia* and *yridomyia* of the genus *Forcipomyia.* Characters e presented for the recognition of larvae, pupae, d adults of members of these groups. The eeding grounds [in Trinidad and Costa Rica] are ported for four potential pollinating species, hich are described and figured in all stages. rom author's abstract to first paper.] The second per gives a general outline of Dr. Saunders' vestigations.

39. Naundorf, G.
Beitrag zur Katalase-Aktivität bei der Befruchtung des Kakaos. **(Observations on catalase activity during fruit formation in cacao.)**
*Gordian*, 1958, **58** (1387): 44-6.

ata are presented and discussed on catalase tivity in cacao flowers, leaves and pods, in self-erile and self-fertile carpels, and in the carpel of a lf-fertile flower during a growth flush and during ormancy.—Campana nac. Cacao, Colombia.

940. Naundorf, G.
Degenerationserscheinungen beim Kakao. **(Phenomena of degeneration in cacao.)**
*Gordian*, 1958, **58** (1393): 10-12, bibl. 8, illus.

he incidence of valueless, parthenocarpic pods is ery much on the increase in certain parts of olombia, both among well-established cacao lones and seedlings. The cause of this phenomenon as yet unknown, but it has been shown experi-entally that growth substances sometimes added insecticidal and fungicidal sprays are not esponsible for it.

2941. Thresh, J. M.
**The control of cacao swollen shoot disease in Nigeria.**
*Trop. Agriculture Trin.*, 1959, **36**: 35-44, bibl. 20.

The situation in Nigeria is reviewed and the efficiency of present attempts to control the spread of disease discussed [see also *H.A.*, 29: 1889]. Until 1950 only trees with disease symptoms were cut out, but this resulted in eradication of the smallest outbreaks only. Since then apparently healthy trees within 30 yards have also been cut out and this has enabled two-thirds of the treated outbreaks to be eradicated. Coppicing experiments now indicate that this drastic treatment could be modified and outbreaks treated according to size, apparently healthy trees adjoining relatively small outbreaks being cut out within a smaller radius.

2942. Dudman, W. F., and Nichols, R.
**Absence of gibberellin-like substances in filtrates of *Marasmius perniciosus* Stahel (witch broom disease of cacao).**
*Nature*, 1959, **183**: 899-900, bibl. 1.

Culture filtrates of *M. perniciosus* and *Fusarium moniliforme* were applied to cacao and rice seedlings. Whereas the *Fusarium* filtrates caused marked internode elongation, no stimulatory or inhibitory effects were observed with the *Marasmius* filtrates. Extracts from infected cacao tissue were also applied to find out if growth substances are produced by *Marasmius in vivo*, but these also failed to have any effect.—Colon. microbiol. Res. Inst., and I.C.T.A., Trinidad.

2943. Bridgland, L. A., and Byrne, P. N.
**Control of the giant snail (*Achatina fulica*) by baiting.**
*Papua New Guinea agric. J.*, 1956 (issued 1959), **11**: 67-8, illus.

Two methods successfully protected young cacao seedlings. The better of the two consists of cardboard rings, made from strips 3 ft 6 in. × 3 in., coated with a Flintkote/metaldehyde mixture. These are placed round the seedlings and protect them for 2 to 3 months, although the effect of reducing the snail population lasts considerably longer. The other method consists of small blocks made from cement, sawdust and metaldehyde which last for about 12 months and give good protection when 4 are placed around each planting site. Methods of preparing the baits are described.

2944. Lozada S., B.
Las agallas de los cojines florales del cacao. **(Galls on the floral cushions of cacao.)**
*Rep. III Reun. interamer. Fitogen. Fitopat. Ent. Edafól., Bogotá, 1955*, 1958, pp. 242-3, bibl. 4.

Microscopical examination of galls on cacao flower cushions showed that these were caused by a species of *Eriophyes* which produced similar galls on mangoes. Spraying with wettable colloidal sulphur at 2–5 lb. per 50 gal. of water, or with calcium polysulphide, is recommended for control.

2945. Bowman, J. S., and Casida, J. E.
**Systemic insecticides for *Theobroma cacao* L., their translocation and persistence in foliage and residues in cacao beans.**
*J. econ. Ent.*, 1958, **51**: 773-80, bibl. 15, illus.

From preliminary screening of 14 systemic compounds with cacao seedlings in Costa Rica, Thimet, Chipman R-6200 (O,O-diethyl S-(2-diethylamino) ethyl phosphorothiolate), demeton, Osolan and dimefox were selected for further study. Thimet and Chipman R-6200 were readily translocated into the foliar portions of cacao trees and persisted for as long as 20 months after a single trunk implantation treatment. Little or no residues were found in the cacao beans at any time after treatment regardless of the pod position on the trees in relation to the site of implantation. Studies with radioactive R-6200 demonstrated a high concentration of phosphorus-containing residues in the cotyledons of the cacao beans, but these materials did not partition into chloroform and did not inhibit cholinesterase and therefore cannot be considered as hazardous residues. No off-flavors were detected in chocolate from beans harvested from any of the systemic treatments, but definite off-flavors were obtained when BHC was used as a foliar spray. The insecticidal efficiency of the systemics was not studied. [From authors' abstract.]

2946. Thio Goan Loo.
Pembuatan tjoklat setjara mikro untuk pemeriksaan kwalitet bidji$^2$ kakao. (**Manufacture of chocolate on a small scale for testing the quality of cacao beans.**) [English summary $\frac{1}{4}$ p.]
*Menara Perkebunan*, 1958, **27**: 247-8, bibl. 3.

The method described is a modification of that of deWitt [see *H.A.*, 24: 881]. Thirty beans are dried at 95° C. for 30 min., then peeled and the stalks and embryos removed. After roasting at 135° C. for 2 hrs the cacao is ground and mixed, 55: 45, with powdered cane sugar. The mixture is pulverized in a mill at 50° C., and heated in a water-bath with frequent stirring for 2 hrs. Then 0·3% lecithin is added, followed by further heating and stirring in the water-bath for 5 hrs. The mixture may then be poured into moulds and left at room temperature for 3 or 4 days.

2947. Dittmar, H. F. K.
Untersuchungen an Kakao-Fruchtschalen. (**The analysis of cacao pod shells.**) [English and French summaries 10 and 13 lines.]
*Gordian*, 1958, **58** (1387): 48-9, bibl. 6.

The analytical data show that in Brazil theobromine extraction from cacao pod shells is not practicable on an industrial scale. It is suggested that these shells might be used as a fertilizer for cacao, and especially as a source of K.—Inst. Tec. Bahia.

### *Coconuts.*

(*See also* 2980, 3068p, z, 3069e, 3078.)

2948. Marar, M. M. K., and Kunhiraman, C. A.
**Husk burial for the improvement of coconut gardens.**
*Indian Coconut J.*, 1957, **10** (3): 3-11, bibl. 7, illus., [received 1959].

In experiments burying husks between the rows of palms has increased yields and, unless a coir industry places a high value on the husks, is an economic proposition. The trenches need not be deeper than about 15 inches. Maximum benefit from the husks in poor soils may depend on supplementary N and P applications.

2949. Southern, P. J.
**The flame spectrophotometric determination of potassium, sodium, calcium and magnesium in coconut water.**
*Papua New Guinea agric. J.*, 1956 (issued 1959), **11**: 69-76, bibl. 5.

A method suitable for rapid routine analysis is described. It is more accurate for K and Na than for Ca and Mg. Cation contents can vary considerably between neighbouring palms and sampling variations are likely to be large. In these investigations soil K was found to be low, and low K in the nut water was accompanied by high Na.

2950. Middleton, G.
**Lime for coconuts.**
*World Crops*, 1959, **11**: 62, bibl. 2, illus.

In an unreplicated trial on an estate in Ceylon the application of lime to coconuts already receiving NPK improved the vegetative vigour of both palms and cover crop (*Calopogonium mucunoides*). An increased yield is expected.

2951. Leather, R. I.
**Further investigations into the "Cape St. Paul wilt" of coconuts at Keta, Ghana.**
*Emp. J. exp. Agric.*, 1959, **27**: 67-78, bibl. 19, map.

Disease symptoms, additional to those already recognized, are described, and the effect of the disease on growth is discussed. The past spread and occurrence of the Cape St. Paul wilt and allied maladies are considered in some detail. Reference is made to the soil in the area, the ground water relationships, and mineral nutrition in relation to the disease. A summary is given of the pathological investigations, and attention is drawn to the failure to transmit the disease. Various theories regarding the causes of the Cape St. Paul wilt and its relationships with the bronze leaf wilt in Trinidad are cussed. An account is given of further studies progress and contemplated, including the study possible resistance. [Author's summary.]—Dep. ric., Ghana.

52. Hoyt, C. P.
**Rhinoceros beetle control in the South Pacific.**
*S. Pacif. Commiss. quart. Bull.*, 1958, **8** (4): 18-20, 45, from *Trop. Abstr.*, 1959, **14**, Abstr. g734.

e most satisfactory method of control has been e elimination of breeding places. Insecticidal ntrol is slow, laborious and costly. A promising edator, *Scarites madagascariensis*, has been found Madagascar.

53. Antony, J., Kurian, C., and Menon, K. P. V.
**Trap the rhinoceros.**
*Coconut Bull.*, 1958, **12**: 331-5, illus.

n estate-scale experiment is described in which *yctes* damage was effectively reduced by the use traps. These consisted of sheltered pits of caying organic matter and cattle manure treated th BHC suspension at the rate of 12·8 oz. of % BHC in 2 gal. water per 10 cu. ft. of material each pit. Each pit measured 4 ft. × 2½ ft. × 1 ft. and re were 15 pits in 6·36 acres. The trap material s renewed every 6 months. Records of beetle mage were taken for 5 years; this remained low 5% in the treated area and reached 42% in a ntrol block.—Cent. Coconut Res. Stat., Kayanlam.

54. Marar, M. M. K., and Kunhiraman, C. A.
**Studies on the keeping quality of ripe coconuts in storage.**
*Indian Coconut J.*, 1957, **10** (4): 37-51, bibl. 7, illus., [received 1959].

oss of weight and drying-out of nut water both creased with length of storage and were reduced storage in sand. Husking caused increased rying-out but reduced weight loss. Vertical orage with the stalk end upwards somewhat duced losses of weight and water.

955. Gregory, G. B., Sills, V. E., and Palmer, J. A.
**Copra driers, principles of copra drying and practical applications.**
*Bull. Dep. Agric. Fiji* **32,** 1958, pp. 36, bibl. 11, illus., 3s.

his bulletin for planters contains descriptions of everal types of copra kiln, ranging from simple atural-draught driers, which may be constructed n the plantation, to large commercially-manuactured forced-draught driers. There is also a ection devoted to the improvement of copra uality. [See also *H.A.*, 28: 4073-4075.]

### *Coffee.*

(*See also* 3068g, l, n, x, 3069g.)

2956. Coffee Research Station, Ruiru, Kenya.
***Annual Report of the Coffee Research Station, Ruiru, and Coffee Research Services, Kenya, for 1957-8,*** 1959, pp. 77, 25s.

*Field Investigations:* Clean weeding coffee throughout the rains has caused valuable yield increases; although both cattle manure and N fertilizers applied alone increased yields, the two in combination more than halved the response to N alone; for the 11th year in succession P failed to increase yields; anti-leaf-fall treatments showed the value of May spraying. *Agricultural Chemistry:* The results of experiments have shown that N applications, especially at higher rates, should be split during the long rains for optimum effect; investigations showed Mg deficiency to be widespread and to be related to the use of Napier grass as a mulch. *Plant Physiology:* Growth recording studies are reported. *Plant Pathology:* Experiments on leaf rust are in progress; spores are more likely to land on the upper surfaces of leaves in the field and reach the lower by washing or splashing. *Entomology:* Effective control of antestia is now possible with malathion; lacebug may be controlled with parathion or malathion, and 2 applications of the latter are the recommended control measure; white borer control is proceeding satisfactorily. *Coffee Berry Disease Research:* A progress report is given. Research into the mechanical drying of arabica coffee is also reported.

2957. Indian Coffee Board Research Department.
*Leaflets Indian Coffee Bd* **1** to **19,** 1958, pp. as below.

The following leaflets for growers have been issued from the Coffee Research Station, Balehonnur, Nos. 1 and 4 being revisions of leaflets issued in 1948:—

No. 1. Nursery practices in coffee, pp. 4.
No. 2. Nursery practices in coffee (2), pp. 5.
No. 3. Balehonnur coffee selections, pp. 3.
No. 4. Planting practices in coffee, pp. 6.
No. 5. A brief note on coffee grafting, pp. 4.
No. 6. Trends in manuring of coffee, pp. 4.
No. 7. Use of urea for root and non-root feeding of coffee, pp. 2.
No. 8. Shade trees for arabica coffee, pp. 4.
No. 9. Cultural practices and crop processing in coffee, pp. 5.
No. 10. Pests of coffee and their control. (1). The coffee stem borer (*Xylotrechus quadripes* Chev.), pp. 2.
No. 11. Pests of coffee and their control. (2). The green bug (*Lecanium viride* G.), pp. 2.

No. 12. Pests of coffee and their control. (3). The shot-hole borer (*Xyleborus morstatti* Hgdn.), pp. 2.
No. 13. Pests of coffee and their control. (4). The eelworms (nematodes), pp. 2.
No. 14. Pests of coffee and their control. (5). Minor pests, pp. 2.
No. 15. Diseases of coffee and their control. (1). Leaf disease (*Hemileia vastatrix* B. and Br.), pp. 2.
No. 16. Diseases of coffee and their control. (2). Black-rot (*Pellicularia koleroga* Cke., *Corticium koleroga* Cke., V. Hohn.), p. 1.
No. 17. Diseases of coffee and their control. (3). Die-back, p. 1.
No. 18. Diseases of coffee and their control. (4). Nursery diseases, p. 1.
No. 19. Diseases of coffee and their control. (5). Minor diseases, pp. 2.

2958. Vasconcelos da Rocha, J. L.
Café Mundo Novo. Amostragem feita em campo de multiplicação de linhagens para estudo de ocorrência de frutos chochos. **(Mundo Novo coffee. Sampling carried out in the variety propagation field for studying the occurrence of fruits with empty loculi.)**
*Bol. Super. Serv. Café, S. Paulo*, 1958, **33** (380): 13-16, bibl. 7.

Coffee berries deficient in seeds were equally frequent in Mundo Novo and Red Bourbon varieties. The very low incidence of fruits with empty loculi among the plants examined showed that selection had practically eliminated the defect. —Inst. agron., Campinas.

2959. Watkins, G. R.
**Coffee seed germination in vermiculite.**
*Mon. Bull. Coffee Bd Kenya*, 1958, **23**: 330-1, illus.

To avoid the disadvantages of slow germination in nursery beds, cleaned and fungicide-treated coffee seed may be mixed, 1:2 parts, with moist coarse vermiculite and pre-germinated in small polythene bags (a 24 in. × 12 in. bag holding 5 lb. of seeds). The bags should be kept shaded and at about 65° F., when germination should begin in 15–21 days. The seeds should be sieved out and inspected every 2 or 3 days, and the germinating seeds picked out for planting in the nursery. Germination may continue for a month or more, the ungerminated seeds being returned to the bags, after mixing again with moist vermiculite.—Dep. Agric., Tanganyika.

2960. Kuppuswami, B. S.
**Investigations on the vegetative propagation of coffee.**
*Indian Coffee*, 1958, **22**: 459-61, bibl. 1.

Arabica sucker cuttings treated with gibberellic acid at 10 p.p.m. for 3 minutes rooted better than the controls. Increased concentrations reduced rooting, except that 50 p.p.m. produced better rooting in harder, basal cuttings. Treatment for 24 hours was inhibitory.—Coffee Res. Stat., Balehonnur.

2961. Boss, M. L.
**Some environmental factors related to the growth cycle of *Coffea arabica* L.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 327-32, bibl. 17.

In studies at Turrialba, Costa Rica, two main periods of growth in the growth cycle of coffee were apparent between June 1949 and September 1950, viz. a period of minimum growth from August to the middle of January, and one of maximum growth during the remaining 7 months. In these observations minimum vegetative growth was associated with maximum rainfall, high surface soil moisture, low light intensity and low temperatures; the start of vegetative growth was associated with a decrease in rainfall and surface soil moisture, an increase in light intensity, a slight increase in maximum temperatures, and an increase in soil nitrate contents.

2962. Beaumont, J. H., and Fukunaga, E. T.
**Factors affecting the growth and yield of coffee in Kona, Hawaii.**
*Bull. Hawaii agric. Exp. Stat.* **113**, 1958, pp. 39, bibl. 6, illus.

Experiments are described, in which the effects of pruning methods, heavy fertilization and spacing on alternate bearing of *C. arabica* var. *typica* were studied. Various multiple stem systems were used, and trees with relatively young vertical stems and more such stems per tree yielded less but more uniformly than trees with fewer but older verticals. The removal of the oldest vertical (dehorning) did not affect growth, though yield was somewhat reduced. The application of fertilizers, particularly N and K, in the 3rd or heavy crop year increased yield in the 4th year, i.e. tended to overcome alternate bearing. It was apparent that, by shortening the pruning cycle, spacing could be closer and this would increase yield per unit area. At 8 ft. × 8 ft. the spacing was too close for a 4-year dehorning cycle but about right for a 3-year cycle. In general, it was shown that systematic dehorning of rows of trees was feasible commercially as regards both health and vigour and could be practised without material sacrifice of yield.

2963. Suárez de Castro, F., and Rodríguez G., A.
Equilíbrio de materia orgánica en plantaciones de café. **(Balance of organic matter in coffee plantations.)**
*Rep. III Reun. interamer. Fitogen. Fitopat. Ent. Edafól., Bogotá, 1955*, 1958, p. 403.

the coffee soils of Colombia the organic matter ntent was 6–14%, and the N content in the neral soils was 0·2–0·7%. The amount of humus ssing into the soil annually was 5–19 tons per ha., d the surface litter varied between 3 and 15 tons r ha.

54. LAZZARINI, W.
O problema da adubação do cafeeiro. (**The problem of manuring coffee trees.**)
*Bol. Super. Serv. Café, S. Paulo*, 1958, **33** (381): 11-25.

e extended use in Brazil of mineral fertilizers is commended, with organic manures as a supplementary, instead of principal, source of nutrients. one area of exhausted terra roxa soil coffee sponded very strikingly to F.Y.M., potassium loride, and to a combination of both. In another ea a 14-year experiment on differential manuring owed similar results, with the yields from coffee unings+inorganic fertilizer greater than those om F.Y.M.+inorganic fertilizer, but in a third ndy) area F.Y.M. was better than coffee prunings green manure as a supplement to the mineral tilizer.

65. BUSCH, J.
Études sur la nutrition minérale du caféier robusta dans le centre et l'ouest Oubangui. Nouvelles observations. (**Studies on the mineral nutrition of robusta coffee in central and western Ubangui. New observations.**) [English and Spanish summaries ½ p. each.]
*Agron. trop.*, 1958, **13**: 732-60, bibl. 9.

e first part of the paper deals with the results of iar diagnosis, which showed that from March to ovember N, P and K contents are high and Ca Mg low. From November to March the reverse this was found. For each of these elements levels were determined, viz. deficiency levels elow which applications are very necessary, and itical levels above which no further fertilization needed. On a dry matter basis these are: N, 20% and 3·00%; P, 0·09% and 0·14%; K, 00% and 2·00%; Ca, 1·00% and 1·80%; and g, 0·25% and 0·45%. The second part deals ith the influence of soil, cover cropping and anuring on nutrition and yield. In a cultural periment clean weeding gave the highest yield, llowed in descending order by grass mulching, sweet potato crop, a *Leucaena glauca* cover and atural vegetation. Mulching increased leaf P and, a lesser extent, decreased leaf K. Clean weeding nd natural vegetation decreased the N content; n increase in yield due to clean weeding was only mporary. It was not possible to show correlaons between yield and leaf contents of the major ements, but, to a limited extent, yield was nked with the P content of leaves in May and une.

2966. ROBINSON, J. B. D.
**Iron deficiency control. The control of chronic iron deficiency in coffee (*Coffea arabica*) growing on localised native hut or cattle boma sites.**
*Kenya Coffee*,* 1959, **24**: 16-19, bibl. 4, illus.

The cause of the iron deficiency investigated was found to be a high level of exchangeable cations and pH in the soils. Temporary control by the use of the solid injection method of Roach and Roberts, followed by a long term soil amelioration policy of substituting $(NH_4)_2SO_4$ for cattle manure and mulch, are recommended. H.L.

2967. KUPPUSWAMI, B. S.
**Some observations on the shade experiment at the Coffee Research Sub-Station, Chethalli (Coorg).**
*Indian Coffee*, 1958, **22**: 454-8, bibl. 11.

Figures for establishment, girth, height and spread are given for 10 shade tree species 3 years after planting. The shaded coffee is not yet in bearing, but its early growth suggests that *Albizzia lebbek*, *Artocarpus integrifolia* and *Ficus glomerata* are the most promising shade trees.

2968. ALVIM, P. DE T.
Estímulo de la floración y fructificación del cafeto por aspersiones con ácido giberélico. (**Stimulation of flowering and fruiting of coffee by spraying with gibberellic acid.**) [English summary ⅓ p.]
*Turrialba*, 1958, **8**: 64-72, bibl. 19, illus.

Gibberellic acid (GA) sprays at concentrations of 0–100 p.p.m. were applied once, or twice with a 2-hr interval, to branches of 10-year-old coffee trees. Where soil moisture was adequate, the percentage of buds opening in the 9 days following treatment was over 80 with GA at 100 p.p.m., 55–60 at 10 p.p.m., and correspondingly intermediate at 50 and 25 p.p.m., while only 6–7% opened after water spraying. Results from 2 applications were slightly, but significantly, higher than from one. Fruit set was 4–7 times higher on GA-treated than on water-sprayed branches, and the average was nearly 30% higher from 2 applications than from one, but based on the number of flowers open 9 days after treatment, the percentage of fruit set was the same following 1 or 2 applications. When soil moisture was deficient, only the 2 highest concentrations of GA gave satisfactory results, and no buds opened on the water-sprayed branches. In a separate experiment, immersion of budding branches in water at 15, 20 and 35° C. for 1 hr caused 3·5, 46·5 and 65·5% of the buds to open in 9 days, as against 72·5% after spraying with 100 p.p.m. GA. No buds opened on untreated or defoliated branches. There was no translocation of either the water or GA stimulus to untreated branches or to other nodes of the same branch, and when GA was applied to only one side of a node, the buds on the other side did not respond. A minimal bud length of nearly 4 cm. appeared essential for response. The least abortive of the "star" type buds set normal fruit after treatment with 100 p.p.m. GA. Extended experimental work with GA might conceivably lead eventually to a reduction of the 12 or more annual coffee harvests in Costa Rica to only one.

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* Formerly *Mon. Bull. Coffee Bd Kenya.*

2969. Monaco, L. C., and Carvalho, A.
Efeito da giberilina em mutantes de café. **(Effect of gibberellin on coffee mutants.)** [English summary ½ p.]
*Bol. Super. Serv. Café, S. Paulo*, 1958, **33** (380): 17-24, bibl. 6, illus.

Gibberellic acid at 1,000 p.p.m. was applied weekly for 3 weeks to the growing points of main axes on cotton wool, held in place by glass tubes, the total amount received being 3 mg. per plant. The *crispa*, *mucronata* and *crassinervia* mutants of *Coffea arabica* responded rapidly by elongating the 3 or 4 youngest internodes and producing leaves that were longer, and sometimes narrower, than normal. A treated *mucronata* plant died, as did the 1-year-old *crassinervia* plants. The abnormal elongated tops of 2-year-old *crispa* plants also died back, whereas older plants of this form and of *crassinervia* resumed normal growth 2–3 months after treatment. S. Ramon and S. Bernardo, both semi-dwarf forms, produced enormously elongated upper internodes, and in the latter the new leaves were broader as well as longer than normal, but again characteristic growth was resumed later. A homozygous genetical dwarf (*nana*) showed no response among 2-year-old plants, and only a slight response among older plants. A 12-year-old plant of the small-leaved form C790, which had never flowered, responded only vegetatively.—Inst. agron., Campinas.

2970. Bitancourt, A. A.
As manchas da fôlha do cafeeiro. **(Leaf spot diseases of coffee.)**
*Biológico*, 1958, **24**: 191-201, bibl. 2, illus.

Coloured illustrations of symptoms, and in most cases brief notes on control, are included for bacterial spot (*Pseudomonas garcae*), "oil spot" (cause uncertain), anthracnose caused by a variety of *Colletotrichum gloeosporioides*, leaf spots caused by *Cercospora coffeae*, *Mycena citricolor* (=*Omphalia flavida*) and *Septoria berkeleyi*, sooty mould (*Capnodium* spp.), chloroses due to nutritional deficiencies and climatic conditions, ring spot virus, damage caused by leaf miners (*Perileucoptera coffeella*), and bronzing caused by the red spider mite *Paratetranychus ilicis*. [See also *H.A.*, 28: 4091.]

2971. Bianchini P., C. L., and Wellman, F. L.
Experimentos en el control de *Pellicularia* del café y ciertas diferencias en pelicularias de cinco huéspedes. **(Experiments on control of *Pellicularia* [*koleroga*] of coffee, and some differences between *Pellicularia* spp from five hosts.)** [English abstract and summary ½ p. each.]
*Turrialba*, 1958, **8**: 73-92, bibl. 24, illus.

In one season's field experiments koleroga disease of coffee, caused by *Pellicularia koleroga*, was satisfactorily controlled by lead arsenate, Tritophthorol (a zinc dithiocarbamate compound), and Perenox (cuprous oxide). Results with Orthocide (captan) and Fermate (ferbam) were not as good as laboratory tests had suggested. Tuzet (thiram+ziram+Urbazid), while giving good control of the fungus, proved seriously phytotoxic to coffee.

2972. Puzzi, D., and Orlando, A.
Ensáios para seleção de substâncias, sob forma líquida, como atraentes para a mosca do Mediterrâneo—*Ceratitis capitata* (Wied.). **(Selective trials of liquid baits for the Mediterranean fruit fly—*Ceratitis capitata*.)** [English summary ½ p.]
Estudos de substâncias atrativas à mosca do Mediterrâneo—*Ceratitis capitata* (Wied.) na forma de iscas sêcas, com o emprêgo de uma nova técnica. **(A study of dry baits for the Mediterranean fruit fly—*Ceratitis capitata*—using a new technique.)** [English summary ½ p.]
*Arq. Inst. biol. S. Paulo*, 1957, **24**: 137-49, bibl. 7, and 151-61, bibl. 5.

In coffee plantations in S. Paulo, the best liquid bait for use in traps was a 5·0–7·5% solution of brown sugar, the effectiveness of which was not improved by additives intended to activate or inhibit fermentation, and was reduced by the wetting agent Triton X 100. Aqueous solutions of protein hydrolysates were not successful baits for this pest, but were highly attractive to the secondary fruit pest *Lonchaea pendula*. The traps used for solid bait were petri dishes with 2 small invaginated openings pierced in the lid and one in the base. The rim of the lid had 3 small equidistant rings through which wires were fixed for hanging the disc in an inverted position, after allowing drops of poisoned bait to dry on the inner surfaces. Protein hydrolysate (yeast) in this form proved highly attractive to *Ceratitis*, but results were almost equally good with the more economic molasses. [See also *H.A.*, 29: 1841.]

2973. González Mendoza, R., and Valenzuela V., G.
Investigaciones sobre el combate de los complejos simbióticos radiculares cóccidos-hormigas del cafeto (*Puto* spp., *Aumyrmococcus* spp., *Rhizoecus* spp., *Geococcus* spp.,

*Neorhizoecus* spp., *Rhizomyrma* spp.). **(Investigations on control of symbiotic ant-mealybug complexes of coffee roots (species of *Puto, Aumyrmococcus, Rhizoecus, Geococcus, Neorhizoecus* and *Rhizomyrma*).)**
*Rep. III Reun. interamer. Fitogen. Fitopat. Ent. Edafól., Bogotá, 1955*, 1958, pp. 280-1.
complexes can be controlled by eliminating of the constituents, preferably the ants. In eral, insecticides were more effective as emul- ns than in other forms. Other factors contribut- to their success were wet weather, undisturbed and the absence of weeds. Aldrin gave the best trol, followed (in decreasing order of effective- s) by dieldrin, endrin, isodrin and chlordane. ants were controlled by aldrin at 0·0693% ght/volume (3 c.c. of Aldrex 2 per l. per sq. m.).

4. Yust, H. R., and Cevallos G., M. A.
Cochinilla anaranjada en café robusta y su control. **(Orange scales on robusta coffee and their control.)**
*Rep. III Reun. interamer. Fitogen. Fitopat. Ent. Edafól., Bogotá, 1955*, 1958, pp. 282-3.
he coastal area of Ecuador robusta coffee was ch more heavily infested than arabica by *enaspidus articulatus*. Excellent control (97% tality) of the adult scales was achieved by ying the foliage with a 1·5% oil emulsion aining 1·5 lb. of 15% parathion per 100 gal. h parathion alone, at 3 lb. per 100 gal., the tality was 74·4%, and with the oil alone at 2%, as only 51·7%. The slight damage suffered by leaves from the mixture was only of temporary equence.

5. Pereira, J., Jr.
Método rápido da liberação da mucilagem do café despolpado pela ativação de suas próprias enzimas. II. Desgomagem rápida do café despolpado em contraste com a fermentação prolongada: mucilagem bruta liberada. **(Rapid method of freeing depulped coffee from mucilage by activating its own enzymes. II. Rapid mucilage removal from depulped coffee contrasted with prolonged fermentation: crude mucilage separated.)** [English summary ⅓ p.]
*Arq. Inst. biol. S. Paulo*, 1957, **24**: 93-103, bibl. 11.
pulped coffee was immersed in various solutions, d in running water with and without acidifica- n, to compare the rate and extent of mucilage noval with that brought about by fermentation 20 or 44 hours. After ½ hr in a solution con- ning 0·16% of calcium hydroxide and 0·1% sodium chloride at pH 9 the mucilage yield from g. of coffee was 14·9 g., compared with 17·5g. er 20, and 5·79 g. in another instance after hours' fermentation. Approximately equal lds (12·3 g.) were obtained in the ½-hr period with running water, and with 0·2% aluminium sulphate. Filtration of the mucilage removed by running water took 44–46 hours, whereas the process was complete in under ½ hr in the lime/salt solution and in 1¼ hrs in aluminium sulphate. After air drying for 20 hours all the treated portions of coffee were separately stirred for ½ hr in fresh lime/salt solution. The final totals of mucilage removed were approximately equal, except for a rather lower yield from the acidified water and a slightly higher one from the 20-hr fermentation. [For Part I see *H.A.*, 28: 1891.]

2976. Henderson, G. R.
**Simple coffee drying.**
*Kenya Coffee*,* 1959, **24**: 49-51, illus.
A simple inexpensive drier has been devised, in which a rectangular building, open on the long sides, is fitted with 5 tiers of runners on these sides, extending outwards and so arranged that 3 trays on each runner are exposed to full sun when pushed out. Running the trays out or in takes 3 workers about 3–5 minutes. H.L.

2977. Cambrony, H. R.
À propos d'un essai de triage électronique de café vert. **(A trial on the electronic grading of fresh coffee.)**
*Café, Cacao, Thé*, 1958, **2**: 131-8, bibl. 4, illus.
Two systems of electronic sorting are described, and their technical and economic advantages discussed. One of the machines tested was British (R. W. Gunson (Seeds) Ltd.) and the other American (Electric Sorting Machine Co.). Both are illustrated.

### *Mangoes.*

(*See also* 3068k, 3069b.)

2978. Alicbusan, R. V., and Schafer, L. A.
***Diplodia* rot of mango.**
*Philipp. Agric.*, 1958, **42**: 319-22, illus.
A storage rot caused by *Diplodia* sp. is described. Warm and moist storage conditions favour the spread of the disease, and it is suggested that dried banana leaves, commonly used for packing, may be a source of inoculum.

### *Oil palms.*

2979. W.A.I.F.O.R.
***Sixth Annual Report of the West African Institute for Oil Palm Research, 1957-58,*** 1958, pp. 143, 2s. 6d.
The progress of numerous experiments and studies is described, including the following: *Agronomy:* experiments on nutrition and cultural practices in the pre-nursery and nursery stages, and on establishment in the field; planting and farming experiments, including seedling selection, various cultural practices, fertilizers and trace elements; harvesting,

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* Formerly *Mon. Bull. Coffee Bd Kenya.*

pruning, replanting studies and the improvement of natural groves. *Plant breeding:* hybridization, introductions, selection and inheritance studies. *Plant nutrition:* sand culture experiments and field trials, largely concerned with minor elements and particularly with Mg. *Plant pathology:* studies on nursery seedling diseases. *Plant physiology:* germination studies and seed storage. *Research engineering:* investigations on mills and hand presses.

2980. Institut de Recherches pour les Huiles et Oléagineux (I.R.H.O.).
*Rapport annuel 1957.* (**Annual Report of the Institute for Research on Oils and Oil Plants for 1957**), Paris, [1958?], pp. 93, illus.

Progress reports are included on the following subjects: *Oil palms:* Selection and breeding; artificial fertilizers (a positive correlation has been found between seasonal yield and rainfall over the 2 preceding years); potash studies (it was shown that the tree uses up all its foliar reserves of K before production falls to the level of minus-K controls, and that it rapidly builds these reserves up again before production is increased); mineral gradients according to leaf order; minor element studies; plant protection, including Mg deficiency; *Fusarium* disease; blast (shading nursery beds tends to suppress the disease); *Coelaenomenodera* pest; characteristics of palm oils of different origin; study of the carotenoids of the fruit. *Coconuts:* Induced deficiency studies (mainly N and K relations); cover crops (experiments have shown improved growth of the palms due to cover cropping); minor elements; pathology (mainly Kaincopé disease). *Castor:* varietal selection. *Shea butter:* agronomic trials; fractionation.

2981. Christian, W. F. K.
**Cultivation and maintenance of oil palms (in Ghana).**
*Ghana Fmr*, 1959, **3** (1): 7, 11.

As preliminary work in Ghana [no details given here] has confirmed earlier experiments in Nigeria and the Belgian Congo showing that intercropping for the first few years improves the growth and yield of oil palms, this practice is recommended, except on very poor soils, on which the natural bush cover, regularly slashed, should be retained. Ring weeding to the limit of the leaf spread is also recommended. H.L.

2982. Coulter, J. K.
**Mineral nutrition of the oil palm in Malaya. The use of frond analyses as a guide to manurial requirements.**
*Malay. agric. J.*, 1958, **41**: 131-51, bibl. 22.

Methods of sampling and analysis and the expression of results are discussed. The effects of such factors as age of frond, soil type, time of day, variety, etc., on nutrient levels were investigated. Tentative optimum levels for N, P, K, Ca, Mg, Fe and Mn are suggested for old and young palms on coastal clays and on upland soils, and are compared with values determined by African workers. The survey showed that K and Mg are the nutrients most likely to be deficient in Malaya, that the lack of response to N in past experiments may have been due to Mg shortage, and that there may be a Mn deficiency in peat soils.

2983. Wijbrans, J. R., and de Weille, G. A.
Rupsenbestrijding in de oliepalmcultuur. (**Caterpillar control in oil palms.**) [English and Indonesian summaries 1 and 1½ pp.]
*Ber. Alg. Proefst. AVROS, Medan*, **15**, 1958, pp. 17, bibl. 17.

Dieldrin applied as a dust or spray was effective against limacodid caterpillars (mainly *Setora nitens*) on oil palms. The best method of application was a "dust sticking" procedure in which a sticker is carried into an insecticidal dust by a fine water spray, which evaporates before the dust reaches the crop. Both endrin and dieldrin sprays were successful for psychid caterpillars (chiefly *Mahasena corbetti*), but dusts were unsatisfactory. The inclusion of ½% alcohol in an endrin spray gave excellent results without injury to oil palms, cacao or leguminous trees.

2984. Heinisch, K. F., and Partini-Maun-Alibazah, R. A.
Vergelijkende waterbepalingen in palmolie. (**Comparative water determinations in palm oil.**)
*Ber. Alg. Proefst. AVROS, Medan*, **10**, 1957, pp. 10, bibl. 13.

The Karl Fischer titration method was more accurate than the dry matter method for estimating the water content of palm oil, but it is better suited to research purposes than to commercial use.

2985. Heinisch, K. F., and Partini-Maun-Alibazah, R. A.
Diëlektrische waterbepaling in oliepalmproducten. (**Dielectrical estimation of water in oil palm products.**) [English and Indonesian summaries ⅓ p. each.]
*Ber. Alg. Proefst. AVROS, Medan*, **20**, 1958, pp. 10, bibl. 9.

The moisture contents of oil palm kernels and pulp were quickly and accurately determined by means of the dielectrical constant; results were similar to those obtained by the conventional dry weight method. Dielectrical determinations of the moisture content of palm oil, however, are not reliable.

### *Papaws.*

2986. N.S.W. Department of Agriculture, Biological Branch.
**Diseases of the papaw.**
*Agric. Gaz. N.S.W.*, 1958, **69**: 534-8, illus.

scriptions of, and control measures against, wdery mildew (*Sphaerotheca* sp.), dieback, llow crinkle, root rot (*Phytophthora palmivora*), ck spot and stem rot (*Ascochyta caricae*) and e fruit rot (*Gloeosporium* spp.).

### *Pineapples.*

(*See also* 2437.)

87. Wang, H., Chang, S. M., and Huang, C. C.
**The stump-section propagation of pineapple.** [English summary 1¼ pp.]
[*Publ.*] *Taiwan agric. Res. Inst.*, 1958, pp. 12, bibl. 3, illus.

this method the stem is cut longitudinally into sections and each section divided transversely into angular pieces each containing a bud. Five-year-d stems of a Smooth Cayenne selection may oduce 22 bud pieces per stem, and 2- or 3-year-old ems average 13 bud pieces each. Each bud piece sterilized in 1: 800 Uspulun solution for 15 min., en shade dried for a day. They are then planted in ilized sand in the greenhouse, and germination y exceed 80%. When the plants are 8 cm. high 4–5 months they are transplanted to field beds, d later, when 30 cm. high, to the field. In the id beds shading and mulching are necessary.

88. Hwang, Y. J.
**A comparison between autumn and spring planting of pineapples.** [Chinese, with English summary ½ p.]
*J. agric. Ass. China*, 1958, No. 23, pp. 51-7, bibl. 7.

utumn (August–October) planting of pineapples ve better growth, taller plants and more leaves an spring (February–April) planting. Yields re 4·88% higher, but the number of fruits was 4% less. The growing period of autumn plantgs was six months longer, the length and diameter the fruits and the number of eyes was greater and c percentage of first grade fruits was higher with ore deep yellow flesh per fruit. In both cases slips ew more rapidly and gave higher yields than owns. H.L.

89. Hernández-Medina, E., and Lugo-López, M. A.
**Field experiments evaluating the effect of filter-press cake on pineapple yields in Puerto Rico.**
*Proc. Amer. Soc. hort. Sci.*, 1958, **72**: 321-5, bibl. 4.

experiments with Red Spanish pineapples grown n two soils filter-press cake (or mud) was applied various rates up to 32 tons/acre, and a 12: 6: 10 rtilizer at various rates up to 3,000 lb./acre; fferent combinations of N, P and K were also mpared. Yields obtained from plant crops and from a ratoon crop are recorded. The results suggest that in one of the areas as large yields can be obtained by applying 32 tons of filter-press cake plus 1,500 lb. of fertilizer as by applying 3,000 lb. of fertilizer [see also *H.A.*, 28: 1906], but that in the other area high levels of both manures (32 tons and 3,000 lb.) are necessary for maximum yields. On both the soils N proved a limiting factor and on one of them K also gave responses; P did not influence yields in either case.—P.R. agric. Exp. Stat., Río Piedras.

2990. Py, C.
Étude sur la croissance de l'ananas en Guinée. **(A study on the growth of the pineapple in Guinea.)**
*Fruits d'Outre Mer*, 1959, **14**: 3-24, bibl. 5, illus.

The results are presented of sampling and measuring Smooth Cayenne pineapples over a period of 15 months. Number, weight, total surface area of the leaves, weight of the stem, and weight and several dimensions of the "D" leaf are shown for each month. Precise instructions are given for the selection of "D" leaves, which are those which have attained full tissue development but are physiologically not completely mature. The use of "D" leaves as samples in foliar diagnosis studies is discussed.

2991. Lew, G. T.
**Pineapple mealybug control in Taiwan.**
*Höfchen Briefe* (English edition), 1958, **11**: 114-20, illus.

After several years' experiments the author makes the following recommendations for the control of *Dysmicoccus brevipes* on pineapples: Before being planted out, the plants should be dipped in a solution of Folidol E 605 emulsion to make sure that they are free from infestation by mealybugs or other pests. During the first 8 months of growth the plants should receive 3 applications of a Folidol E 605 solution, poured into the leaf axils. In addition, the surrounding soil should be treated with insecticides to kill or repel ants.

2992. Carter, W., and Gortner, W. A.
**The translocation of radioactive ($S^{35}$) Bayer 19639 in pineapple plants.**
*J. econ. Ent.*, 1958, **51**: 905-7, illus.

Radioautographs revealed that the radioactive sulfur in $S^{35}$-tagged Bayer 19639 (Di-Syston) is translocated from the soil through the entire pineapple plant. Absorption is greatest in the roots and decreases to barely discernible quantity in the green half-developed fruit. Bioassays revealed that only in the region of greatest absorption—the roots—was the concentration of Bayer 19639 high enough to be toxic to mealybugs. [Authors' abstract.]—Pineapple Res. Inst., Hawaii, Honolulu.

### *Rubber trees.*

(*See also* 3068a-d, 3069j, n, o.)

2993. TAN HONG TONG, AND HELLE, C. F.
Voorlopig verslag over de toetstappingen en andere observaties in een zaailingen toetstuin op Laut Tador. (**A preliminary report on test tapping and other observations in a seedling trial ground at Laut Tador.**) [English] and Indonesian summaries ½ p. each.
*Ber. Alg. Proefst. AVROS, Medan*, **18,** 1958, pp. 13.

Ten hand-pollinated seedling families were subjected to tapping tests, and in general their production was greater than that of the control clone, AVROS 49. Yields from seedlings having TT5 as a parent were higher than those from other clones.

2994. McINDOE, K. G.
**The development of clonal rootstocks in hevea.**
*Quart. Circ. Rubb. Res. Inst. Ceylon*, 1958, **34**: 39-57, bibl. 7, illus.

The first part of this paper describes experiments designed to elucidate the juvenility phenomenon, in which buds taken from young seedlings produce conical shaped trees and buds from older trees the cylindrical mature shape [see *H.A.*, 26: 4195]. These experiments have shown that buds taken from seedlings below a point roughly 3 ft above the collar produce the so-called juvenile type, whereas buds taken from above this fairly abrupt transitional region produce normal cylindrical trees. These types of growth, it is suggested, should be called "lower stem" (LS) and "upper stem" (US) buddings. The conical shape of LS buddings is maintained into the second and, it is suggested, probably later budded generations by using buds from the lower region of the first buddings. Branching does not affect the phenomenon, the height at which the branch originates determining the character of buds taken from it. There was also evidence that plants arising from buds taken from the lower part of the stem may yield more highly. The second part of the paper is concerned with the development of clonal rootstocks, and it is observed that cuttings taken from the lower regions of seedlings root more readily than those from the upper parts. This is also characteristic of cuttings taken from LS budded plants. Methods of producing large numbers of such cuttings for use as clonal rootstocks are described. These, briefly, consist in cutting back LS buddings, ringbarking and earthing-up the shoots which grow from them and, after roots have been produced, removing the rooted cuttings to a development nursery where, under a mist spray and in full sunlight, satisfactory further growth is obtained.

2995. HELLE, C. F.
Een beschouwing over bodembedekkers
(**A discussion on soil covers.**) [English an
Indonesian summaries ½ p. each.]
*Ber. Alg. Proefst. AVROS, Medan*, 7, 1957
pp. 23, bibl. 11.

The author recommends establishing a mixe
ground cover of bushy and creeping leguminou
species in young rubber or oil-palm plantations
As the tree cover increases, shade-resistant species
such as *Psophocarpus palustris*, may be sown. I
mature plantations, a pure leguminous cover is no
so essential, and a mixture of low growing weed
(*Selaginella* spp. and *Cyathula prostrata*) and shade
resistant creepers (*Desmodium ovalifolium* an
*Vigna hosei*) is satisfactory.

2996. GUHA, M. M., AND WATSON, G. A.
**Effects of cover plants on soil nutrient statu**
**and on growth of hevea. I. Laborator**
**studies on the mineralisation of nitrogen i**
**different soil mixtures.**
*J. Rubb. Res. Inst. Malaya*, 1958, **15**: 175-88
bibl. 24.

The results of incubation studies on the mineraliza
tion of N in soil, and in soil mixed with ammoniun
sulphate, calcium carbonate and plant material
are given. Only low levels of nitrification occurre
in soil alone. Applications of ammonium sulphat
and calcium carbonate, at levels equivalent t
4·3 cwt./acre and 133 lb./acre respectively, ha
little effect on mineralization. Calcium carbonat
applied at a rate equivalent to 4 tons/acre markedl
stimulated nitrification. High levels of ammoniun
and nitrate N were found in mixtures of soil wit
*Centrosema pubescens*, *Pueraria phaseoloides* an
*Mikania scandens* material, while none was foun
in mixtures of soil with hevea leaves and lalan
(*Imperata cylindrica*). [Authors' abstract.]

2997. CONSTABLE, D. H., AND HODNETT, G. E.
**The responses of *Hevea brasiliensis* t**
**fertilizers in Ceylon.**
*Emp. J. exp. Agric.*, 1959, **27**: 150-7, bibl. 3

The results of experimental work with fertilizers o
*Hevea brasiliensis*, carried out since 1940 in Ceylon
have been examined, and the responses to fertilizers
are presented in terms of girth of the trees prior t
tapping. N and P gave generally consisten
responses, and there was also some response to K
(in the presence of P). The relationship between
girth of trees and the yield of latex has also been
examined. [Authors' summary.]—R.R.I. Ceylon.

2998. I.R.C.V.
*Institut des Recherches sur le Caoutchouc au*
*Viêt Nam, Rapport annuel, Recherche de*
*Consommation, juin 1956–juin 1958.* (**Annual**
**Report, Utilization Research, of the Institute**
**for Research on Rubber in Viêt-Nam, June**
**1956-June 1958**), 1958, pp. 63, illus.

hough the report is mainly concerned with ber technology, the first part deals with the ysiological diagnosis of mineral deficiencies in ea. The S/P ratio has been found normally to about 1, though in cases of P deficiency it may as high as 2. The leaf content of Mo is 10–20 $\gamma$% of dry matter, i.e. about 100 times less than that Cu. There is a strong positive correlation ween Mo and N. Studies of the mineral mposition of fresh latex have shown that this rtly depends on the height of tapping on the tree, ber and K contents being higher, and the Mg ntent and Mg/P ratio lower, with low tapping. e effects of mineral injections on latex composi-n are also discussed.

99. Gascoigne, J. A., and Jones, P.
**Biosynthesis of rubber.**
*Nature*, 1959, **183**: 819, bibl. 9.

e authors were unable to incorporate labelled tate and mevalonate into rubber *in vitro* with the of fresh latex, and they, therefore, cast doubt the conclusion that the rubber in *H. brasiliensis* its origin in acetate [*H.A.*, 28: 3114].—Univ. mingham.

00. Taysum, D. H.
**The numbers and growth rates of the bacteria in *Hevea* latex, ammoniated field latex and ammoniated latex concentrate.**
*J. appl. Bact.*, 1958, **21**: 161-73, bibl. 2.

d latex at routine collection contained about $10^6$ bacteria/ml. This could be reduced by 62% the use of sterile tapping cups. In the routine ex, the mixed population grew logarithmically r a lag phase of 2½–3 hrs. In clean latex the lag se was extended to 4 hrs. On ammoniation to % (w/w), the population was reduced over out 2 hrs, but subsequently logarithmic growth urred without a lag phase. On concentration d further ammoniation to 0·7% (w/w), the count pped still further, levels of 10/ml. or less being ieved in clean conditions, but very slow logar-mic growth again occurred with a lag phase ceding it. [From author's summary.]—Rubb. s. Inst. Malaya.

01. John, K. P.
**Inoculation experiment with *Fomes lignosus*, Klotzsch.**
*J. Rubb. Res. Inst. Malaya*, 1958, **15**: 223-40, bibl. 7, illus.

ots of trees, 5 and 25 years old, were inoculated h large pieces of infected root. In half of the culated roots the external growth of the fungus s prevented by removing the mycelium weekly h a stiff brush. This treatment also virtually ted the internal spread of infection. Incidental servations were made on the penetration of the gus and on host reaction.

3002. Riggenbach, A.
**Experiments on the control of *Oidium heveae.***
*Quart. Circ. Rubb. Res. Inst. Ceylon*, 1958, **34**: 58-62, bibl. 5.

Karathane dust, at 24 lb./acre once weekly, was as good as, or better than, sulphur dust at 12 lb./acre once weekly, but not so effective as the same dose of sulphur applied twice a week. The once-weekly dose of sulphur, however, remains the most effective economic estate treatment.

3003. Newsam, A., and Rao, B. S.
**Control of *Coptotermes curvignathus* Holmgren with chlorinated hydrocarbons.**
*J. Rubb. Res. Inst. Malaya*, 1958, **15**: 209-15, bibl. 5.

Chlordane, dieldrin, aldrin and endrin were all effective against termites, dieldrin being the most persistent. One pint of 0·03% or 0·015% dieldrin emulsion per tree was effective for over 2 years. Six types of soil were tested. Peat quickly inactivated the insecticides, and they were less persistent in a coastal alluvial clay than in 4 inland soils.

3004. Anon.
**Control of cockchafer grubs in young rubber.**
*Plant. Bull. R.R.I.M.*, 1959, No. 41, p. 48.

*Holotrichia bidentata* was controlled by pouring at least 4 pints of 0·1% aldrin solution around newly planted seedlings, stumps or young trees. Gamma BHC at 0·04% was also effective.

3005. Anon.
**Fire damage and borers.**
*Plant. Bull. R.R.I.M.*, 1959, No. 41, pp. 36-7.

Borers, mainly *Xyloborus* and *Platypus* spp., invade hevea wood after fire damage. Curative treatment for damaged trees consists of applying whitewash plus fungicide, and, 3 or 4 weeks later, removing the dead bark and applying fungicide to the wound and a petroleum dressing to the callus tissue at the edge of the wound.

3006. Baptiste, E. D. C.
**Poisoning experiments with *Hevea brasiliensis*. I. Preliminary trials—destruction of trees with 2,4-D and 2,4,5-T.**
Baptiste, E. D. C., and de Jonge, P.
**Idem. II. Results of a further tree poisoning experiment with 2,4,5-T.**
*J. Rubb. Res. Inst. Malaya*, 1958, **15**: 189-92, bibl. 4, and 193-204.

In the first paper methods of tree poisoning are briefly reviewed, and the use of the normal butyl ester of 2,4,5-T is shown to be effective. In the second paper experiments are described in which a 5% acid-equivalent concentration in Shell Diesoline was applied to the full circumference of the tree from ground level to a height of 15 in. This treatment killed 70% of the trunks and branches within 6 months, and practically all the trees were dead within 1 year. The lateral roots were killed more slowly, 60% being dead 1 year after treatment. Yields increased markedly for 1 to 3 months after treatment. A record of pathological observations is given.

3007. Tan Hong Tong, Wijbrans, J. R., and Zegers, J. W.
Verslag over een boomdodingsproef op Sungei Pantjur. (**Report on a tree poisoning experiment at Sungei Pantjur.**) [English and Indonesian summaries ¾ p. each.]
*Ber. Alg. Proefst. AVROS, Medan*, **21**, 1958, pp. 13, bibl. 12.

Mature hevea trees were killed by sprays of 2,4,5-T and of 2,4-D, but sprays of sodium arsenite (10%) round the base of each tree were not effective. Trees were killed more quickly with high concentrations than with low concentrations of 2,4,5-T and 2,4-D, and for about 3 months after treatment yields of latex were increased. Yields increased for at least 6 months after sodium arsenite treatment. It is suggested that yields from old rubber trees soon to be grubbed might be increased by sodium arsenite sprays, applied 6 months before 2,4,5-T applications.

### *Sugar cane.*

(*See also* 2398-2401, 3068j, t-w, y, 3069a, f, h-k, m, p, r, t.)

3008. Marassi, A.
La coltura della canna da zucchero nella zona subtropicale della Spagna. (**Sugar cane cultivation in the subtropical districts of Spain.**)
*Riv. Agric. subtrop.*, 1959, **53**: 17-36, bibl. 9.

The area in question stretches along the coast of Granada, Malaga and Almeira for nearly 160 miles, running inland up to 40 miles in places. It has a dry, subtropical climate, which varies, however, considerably from place to place, Malaga showing on a 30-year average a mean temperature of 18·1°C. [65° F.], a maximum of 21·9° C. [71·5° F.] and a minimum of 14·3° C. [57·8° F.]. The area is not subject to frost. The crop is grown generally in rotation, the cane being in position for 4–6 years, and between times a succession of crops covering 2 years, viz. maize, tomatoes, clover, beans, cotton, sweet potatoes. Average production is 800 q. li. per ha. with a return of 8·75% extracted sugar or 60–70 q. li. per ha. The cane is extracted in local factories some of which deal with sugar beet also. The commonest varieties grown are P.O.J. 2727, P.O.J. 2725, Tucuman B-76 and Co.290.

3009. Hawaiian Sugar Planters' Association.
***Report of the Experiment Station Committee for the year ending September 30, 1958***, pp. 78, illus.

*Cultural Practices:* Dividing the application of N fertilizer into 1st and 2nd year dressings had little effect on the yield, juice quality, or N content of young ratoons. Studies using labelled $N^{15}$ showed the plant to prefer fertilizer N to natural N in the soil. In foliar applications $(NH_4)_2SO_4$ was absorbed more slowly than urea. High levels of applied N depressed the K content, but increased the Ca and Mg contents to maintain total bases at a constant level. Adequate K was present if the sheath contained 2·20% K and the tissue of the 8th to 10th internodes 0·82% K. No response to P fertilizer could be expected when the tissue of the 8th to 10th internodes contained more than 0·038–0·046% P. Inadequate stooling was the major effect of P deficiency. In acid soils N in the form of urea or Uramite was leached out least, and aqua potash less than KCl. On low-calcium latosols 10% of the applied Ca was lost through leaching with 50–75 in. of water. Appreciable leaching losses of sulphate from applied $K_2SO_4$ were observed in some soils. A new non-corrosive liquid fertilizer, $Ca(NO_3)_2$ dissolved in aqua ammonia, has been developed. Tests with gibberellic acid showed that a high N level is necessary for this stimulant to exercise its full effect. *Diseases:* Of major importance in 1958 were red rot, chlorotic streak and sour rot; pineapple disease and ratoon stunting were less widespread, and leaf scald very local. Red rot was observed only on variety 38-2915. The fungicide Bayer 22555 gave effective control of *Pythium* root rot. Among soil fumigants tested allyl alcohol was the least toxic to nitrifying bacteria, and Vapam and DD the most effective. A special study of the nematode population was made in an attempt to elucidate varietal yield decline. *Pests:* Sugar cane borer remained the only serious insect pest. A new phase of rat control was ushered in with successful trials of endrin. *Irrigation:* Lysimeter studies showed insolation rather than wind to be the major factor in evaporation. Absorption of irrigation water was more rapid on trash-covered than on bare soil. *Tillage:* The use of the anti-adhesive Teflon enabled a mouldboard plough to improve on the performance of a disc plough by 50%. Soil compaction by trucks in the field was under investigation. *Varieties:* In addition to long-term selection trials experiments were carried out on varietal responses to N and on the control of flowering by altering water regimes, sprays and N and P applications. *Weed control:* Newer herbicides tested included simazine, oil-soluble Triazine and trichlorobenzoic acid, all of which gave effective pre-emergence control, the last, however, damaging the cane. Soil fumigants, such as methyl bromide, Vapam, and ONCB showed value as herbicides, the first named completely destroying a heavy infestation of nutgrass on a heavy clay soil.

H.L.

10. Sugar Manufacturers' Association, Jamaica.
*Annual Report of the Research Department, 1957*, Mandeville, Jamaica, [1959], pp. 86.

ne report summarises the activities of the department in 11 sections and 3 appendices; in those aling with experimental work the results are ven of 244 field trials and micro plots on nearly 0 sites. Among these are: *Irrigation:* Results om a first ratoon crop confirmed that, given equate water, there was no difference between rface and overhead application. The most ective irrigation at Monymusk was at a 2-in. ficit (after 17 days drought). Long-line irrigation as as effective as normal practice on heavy clay ils when the land was properly graded, planting a bank being as good as planting in a furrow, d two rows on a large bank being only slightly s satisfactory than one. *Nutrition:* Early results ve indicated that sub-surface application of rtilizers can markedly increase yields. Optimum vels for N, P and K in the leaf have been obtained crop logging. Extra fertilizer treatments have ven significant increases in medium rainfall and y unirrigated zones and on fields yielding less than tons/acre. Ammonium sulphate appeared to be ore effective than urea, and late application, i.e. 5-month-old cane, gave substantial increments one location. *Cultural:* Trash turning was eficial under heavy rainfall conditions, and deep age by knifing gave useful gains in 2 out of 4 als. Inter-row cultivation was advantageous ere soil had been compacted by infield transort. Heavy clay soils responded to the sub-soil plication of lime. *Varieties:* B.4362, followed by 41227, gave the highest average yields in 1957. the new varieties B.51414, B.51415, and 51418 were the most promising. *Diseases and sts:* Insecticides and fumigants were tested in an a in which nematodes were thought to be sponsible for stunted root systems. While raying with BHC, dieldrin and chlordane gave average increase of 12%, injection of the migants ethylene dibromide, Nemagon, and DD as much more effective, a commercial scale trial ith DD giving a tenfold increase in plant weight 4 months.

H.L.

11. Evans, H.
**A review of selected aspects of sugarcane agronomical investigations in British Guiana.**
*Proc. 1957 Mtg B.W.I. Sugar Tech.*, pp. 34-50.

spects selected are grouped under headings as llows: *Planting:* Two experiments on pre-treatent of cuttings are recorded. The hot water eatment used against chlorotic streak and ratoon unting diseases slightly reduced yields, whereas nflicting results followed the use of mercurial disinfectants against pineapple disease. The conditions required to prevent delay in sprouting following the application of 2,4-D as a pre-emergence herbicide have been worked out. Soil application of insecticides depressed yields except in two instances. In spacing trials no interactions were found between variety, fertilizer application and spacing. *Cultivation and soil amelioration:* No significant differences in yield were found between cultivation before and after flood-fallowing on front-land clays. The effect of subsoiling was significantly favourable, being greatest where no or shallow mechanical cultivation was practised. Where weeds were chemically controlled, cultivating the ratoons showed little advantage. Large responses to liming in Berbice were shown to be due to P deficiency and in Demerara to Ca deficiency and Al/Fe toxicity. A colony-wide trial of Oliver filter mud as an organic-cum-mineral fertilizer gave highly significant responses to dressings of 2 and 8 tons/acre, but a negative interaction with triple supers, which gave even higher yields. As a source of N filter mud at these rates was not so effective as 4 cwt. of sulphate of ammonia. *Phosphatic fertilizers:* Triple superphosphate was a more effective source of P than hyperphosphate. *Irrigation:* In a factorial trial both irrigation and N fertilizer gave significant increases in sugar per acre. *Possibilities of extending the growing season:* There was a considerable reduction in cwt. of sugar/acre/week when the length of the plant plus ratoon cycle was extended, and, hence, this practice is not considered promising.—Bookers Sugar Estates, B.G.

3012. Chinloy, T., and Smyth, I. de F.
**Some aspects of cane agriculture operations.**
*Jamaican Ass. Sugar Tech. J.*, 1957, **20**: 1-10.

This is an analysis of the speed and effort used on 5 estates for the various operations carried out on plant canes prior to harvesting. Methods designed to improve efficiency are discussed.

3013. Bourne, B. A.
**Bagasse for marcotting cane stalks for breeding.**
*Sugar J.*, 1959, **21** (9): 13-16, bibl. 3, illus.

Excellent rooting was obtained in marcots by using bagasse, ground in a Wiley mill equipped with a 6 mm. screen, or bagasse pith, saturated with 1% calcium nitrate plus 0·2% sodium peroxide solution, or the latter alone. This also proved much cheaper than using sphagnum moss. The addition of IBA increased rooting, but the effect of the hormone on pollen production and seed setting is not yet known. Better cohesive properties were obtained by adding 1·375 lb. of sodium carboxymethylcellulose gum per 100 lb. of bagasse pith.—Res. Dep., U.S. Sugar Corp.

3014. Yang, C. S.
**A study on the competitive ability and yields among sugar cane varieties. (Preliminary report.)** [Chinese, with English summary $\frac{1}{3}$ p.]
*Rep. Taiwan Sugar Exp. Stat.*, 1957, No. 16, pp. 37-48, bibl. 8.

In an experiment to test the suitability of the Hawaiian bunch planting method of selection plots of 5 varieties were planted as single plants and as bunches of 5 seedlings. The results showed the same order of performance whether the varieties were singly or bunch planted, i.e. good yielders were also good competitors.

3015. Ilaga, M. T., and Calma, V. C.
**Correlation studies on some agronomic characters of first generation sugar cane seedlings and their second generation asexual progenies.**
*Sugar News*, 1958, **34**: 625-30, bibl. 19.

Correlations were calculated for tillering capacity, stalk diameter, stalk length and refractometer brix, but significant positive correlations were obtained for the first 2 characters only. It is suggested that they may be used as criteria for selection in the nursery.

3016. Buzacott, J. H.
**Mackay varieties in the far north.**
*Cane Grs' quart. Bull.*, 1959, **22**: 108, illus.

Q.58 and Q.63 are recommended for northern Queensland as they resist both water-logging and drought. Q.58 is a strong ratooner with a good sugar content and resists lodging. Q.63 has a very high sugar content but makes a rather sparse cover.

3017. Wang, S. C., and Shiue, J. J.
**Significance of water and carbon dioxide in the evolution and reclamation of salted alluvial soils in Taiwan.** [Chinese, with English summary 7 pp.]
*Rep. Taiwan Sugar Exp. Stat.*, 1957, No. 15, pp. 17-48, bibl. 32.

Recommended measures to reclaim saline areas are as follows: increased irrigation facilities, lowering the ground water level, deep drainage, deep ploughing, planting *Sesbania sesban* as a green manure, applying organic manures, interplanting cane with rice, mulching to prevent evaporation, planting salt tolerant varieties such as N:Co.310, and scraping and removing the surface soil from small alkali patches. Gypsum applications have not increased cane or rice yields and are not recommended.

3018. Aziz, H.
**Dry planting of sugarcane.**
*Agric. Pakist.*, 1958, **9**: 164-9, bibl. 5.

Dry planting means placing the setts in furrows in dry soil and irrigating immediately afterwards. This method, compared with the usual one planting in wet soil, was cheaper and gave improv germination. With a late planted crop yield w also increased.

3019. Li, L. H., and others.
**The effect of mother-shoot repression a earthing-in practices on the yields of so commercial varieties of sugarcane in Taiwa** [Chinese, with English summary 1 p.]
*Rep. Taiwan Sugar Exp. Stat.*, 1957, No. 1 pp. 49-61, bibl. 2.

Neither the artificial increase of tillers by vario methods of repressing the main shoot, nor t practice of evenly distributing tillers by pressi soil between them, thus spreading the stool, caus yield increases, except for the latter treatment the case of one poor tillering variety. In some cas yields were even reduced by these treatments.

3020. Yates, R. A.
**Cane quality in British Guiana: the effect rainfall and yield of cane on cane quality ar cost of production, on certain east coa estates.**
*Proc. 1957 Mtg B.W.I. Sugar Tech.*, pp. 73- bibl. 1.

Analysis of routine production data showed rai to have an adverse effect on quality, especially rai falling in the four weeks prior to, and including, th week of cutting. This rainfall, however, had onl insignificant effects on production costs. Increase cane yields also unfavourably influenced quality The optimum average economic yield was foun to be approximately 50 tons/acre for the whol cycle (plants plus ratoons).—Bookers Sugar Estates, B.G. H.L.

3021. McFarlane, J. R.
**Drought conditions and juice characteristics 1. The effect of environment and field conditions on mud volume.**
*Proc. 1957 Mtg B.W.I. Sugar Tech.*, pp 51-61.

For the purpose of this investigation one juice characteristic, namely percentage mud volume after 1 hour's settlement, was chosen. Rainfall, maturity of cane and cycle were found to influence mud volume directly, while soil type, age of cane and juice purity did not, although there were indications that a more definite soil classification might alter this. Investigation of varietal differences gave inconclusive results.—Antigua Sugar Factory. H.L.

3022. Cleasby, T. G.
**Overhead irrigation and its problems.**
*S. Afr. Sugar J.*, 1959, **43**: 113-23, bibl. 3.

The problems adumbrated are water availability, costs of installation, frequency of application and economics. The application of 1 in. in 15 days oughout the year has been found to give 60–80% tection against wilting from November to rch and complete protection for the rest of the r. In an unreplicated long term trial, spray gation gave an increase of 55 tons/acre over ears compared with surface application, and tons/acre more than the control. H.L.

3. THOMPSON, H. M.
**Some preliminary observations on the data collected from crop logging experiments.**
*Jamaican Ass. Sugar Tech. J.*, 1957, **20**: 35-42, bibl. 6.

emical analyses were made periodically through- t the growth of the crop on leaf and sheath terial taken from 124 fields, to which additional tilizer had been applied. Comparisons for N, P d K, sheath moisture and elongation rate ween normal and high fertilizer levels are shown phically and discussed. Sheath moisture and ngation rate were clearly related, and regression ations are given for both irrigated and high nfall areas.

4. YANG, C. C.
**Field experiment on the application of green manure and sugarcane trash as mixed organic manure for sugarcane.** [Chinese, with English summary 2 pp.]
*Rep. Taiwan Sugar Exp. Stat.*, 1957, No. 15, pp. 123-40, bibl. 9.

ar cane, growing on sandstone alluvial soil, ponded both to artificials (87% increase over trol in yield of sugar) and various organic nures (117–145%). Sugar cane trash increased e yield in proportion to the rate of application, d, to a lesser extent, reduced the sugar content. eduction in sugar content generally followed the of organic manures. Cane trash competed with crop for soil N, but green manure did not, and s recommended that the two should be applied gether. Composting the trash, a labour consum- process, is not recommended.

25. WANG, S. C., AND LI, K. Y.
**Field experiments on the comparative effects of muriate of potash, spent wash concentrate and molasses upon sugar cane.** [Chinese, with English summary ¾ p.]
*Rep. Taiwan Sugar Exp. Stat.*, 1957, No. 15, pp. 113-22, bibl. 5.

olasses was less effective than spent wash con- ntrate except at high application levels. Potash creased cane yields, especially on red earths, but th year-to-year differences due to climate.

26. LI, L. H.
**Experiments on the application of bagasse in non-irrigated heavy clay soil.** [Chinese, with English summary 1½ pp.]
*Rep. Taiwan Sugar Exp. Stat.*, 1957, No. 16, pp. 62-72, bibl. 2.

In a series of experiments, in which bagasse was utilized at different rates and in different ways, it was found that its incorporation into the soil a rates of 10–60 metric tons/ha. reduced cane yields by 10–20%. Mulching at 40 m.t./ha. once or twice at the beginning of the dry season increased yields by 5 and 7·7% in two years respectively. A mulch of stripped dry cane leaves tended to reduce yields.

3027. MUTHUSWAMY, R.
**Effect of inorganic and organic nitrogenous manures on germination and yield of sugarcane.**
*Indian Sugar*, 1958, **8**: 499-506, bibl. 9.

Two experiments are described, in which varying proportions of ammonium sulphate and castor cake were applied at planting time to non-irrigated cane in a dry area. The ammonium sulphate was the cheaper source of N, but a high proportion in the mixture caused reduced germination, tillering and yield. It is suggested that 50% N as castor cake plus 50% N as ammonium sulphate is the most economic combination.—Messrs Begg, Sutherland & Co., Marhowrah, Bihar.

3028. TABAYOYONG, F. T., AND BASILA, F. A.
**A review of variety × fertilizer tests (6 × 6 factorial) harvested during 1955-56 and 1956-57 crop years in Victorias milling district.**
*Sugar News*, 1958, **34**: 631-8, 690-8, bibl. 1.

The highest yielding varieties were C.P. 29/116, Co.440 and Co.449 [see also *H.A.*, 29: 1940], which gave 44%, 31% and 36% more sugar per ha. respectively than the standard variety P.O.J. 3016, when fertilized respectively with 120–100–180, 150–120–240 and 120–100–180 kg. per ha. of $N–P_2O_5–K_2O$. Regardless of variety the highest cane and sugar yields were obtained using 150–120–240 kg. per ha., but the most profitable yields were obtained using 120–100–180 and 90–80–120 kg. per ha. In general, variety–fertilizer interactions were insignificant.

3029. INNES, R. F., CHINLOY, T., AND THOMPSON, H. M.
**Aqueous ammonia as a source of nitrogen on the sugar cane soils of Jamaica.**
*Proc.* 1957 *Mtg B.W.I. Sugar Tech.*, pp. 193-204, bibl. 11, illus.

Aqueous ammonia injected into the soil at dosages equivalent to 1 to 6·6 cwt./acre of sulphate of ammonia gave responses varying from 41 to 71% of those obtained with the same amount of the sulphate. When added to irrigation water the response was only half that of sulphate of ammonia. The cost of handling aqueous ammonia in Jamaica was about £5 a ton greater than that for the sulphate. —Res. Dep., Sugar Mfrs' Ass., Jamaica. H.L.

3030. Hartt, C. E.

**Total phosphorus in internodes 8-10 as a guide to the phosphorus fertilization of sugar cane.**

*Hawaii. Plant. Rec.*, 1958, **55**: 243-70, bibl. 8.

Determinations of total P in internodes 8–10 of samples collected during a good growing season from plants aged approximately 6 to 12 months may help in estimating phosphate requirements. When P is below 0·032%, increased yields may follow phosphate application. Between 0·032 and 0·040%, P may be applied as an insurance, because yield gains are expected occasionally in this borderline range. Phosphorus applications are not necessary when P levels are above 0·038–0·046%. Among factors affecting the percentage of P in internodes 8–10 are supply of soil P (its variation accounts for 83% of the variation in plant P), supply of K, N, Ca or Mg, age of plant and light intensity.

3031. Freshwater, I. T.

**More droopy top.**

*Cane Grs' quart. Bull.*, 1959, **22**: 104-5, illus.

Copper deficiency causes the top of the cane stalk to become limp and rubbery with drooping leaves. The leaves are pale with dark green patches. It may be corrected by the application of 56 lb. per acre of copper sulphate. This is best done by mixing with the fertilizer, as spraying in a water solution may cause burning.

3032. Hu, T. H., and Lee, S.

**Photoperiodic experiments for inducing flowering of sugarcane.** [Chinese, with English summary 1 p.]

*Rep. Taiwan Sugar Exp. Stat.*, 1957, No. 16, pp. 22-36, bibl. 12, illus.

Six varieties which had never flowered and one which had flowered sparingly were given 4 treatments, viz. a day-length of 12 hrs 30 mins. gradually shortened by 1 min. per day; a day-length of 12 hrs; the first day-length combined with heating at night; and the second with heating at night. The heating treatment varied but was always 1–2° C. higher than the unheated. Both day-lengths induced flowering in different varieties, and the effect was enhanced by raising the night temperature. Flowering habits and pollen fertility were normal, and the tassels were used for hybridization.

3033. Bates, J. F.

**Preliminary experiments on the effects of gibberellic acid on germination, growth and flowering in sugar cane.**

*Proc. 1957 Mtg B.W.I. Sugar Tech.*, pp. 165-73, bibl. 13.

All the varieties tested showed marked growth responses to GA, whether applied as a spray, a dip, or as drops in the spindle. Germination of both setts and fuzz was also improved. Practical applications, drawbacks and lines on which futur experimental work should be carried out ar discussed. H.L.

3034. Yates, R. A., and Bates, J. F.

**Preliminary experiments on the effects o chemicals on the ripening of sugar cane.**

*Proc. 1957 Mtg B.W.I. Sugar Tech.*, pp 174-89, bibl. 24.

The results are summarized of 5 years' experimenta work on the acceleration of ripening by growth regulators, enzyme inhibitors, desiccants and roo toxins. Few consistent responses were obtained most of them negative. Dowpon (2,2-dichloro proprionic acid) and Kuron (α-α-dichlorophenoxy proprionic acid) proved the most promising chemicals, but 2,4-D and 2,4,5-T did not give the results reported elsewhere.—Bookers Sugar Estates B.G. H.L.

3035. Fretay, E.

Application foliaire de 2,4-D pour améliorer la richesse en sucre des cannes. (**Foliar application of 2,4-D to improve the sugar content of sugar cane.)**

*Rev. Agric. sucr. rhum. Antilles franç.*, 1958, **3** (1): 69-74, from *Trop. Abstr.*, 1958, **13,** Abstr. f2937.

Applications at 120 p.p.m. improved plant and ratoon crops where maturing conditions were favourable, but did not increase the sugar content of cane growing under regular irrigation.

3036. de Sornay, A.

**Resistance of sugarcane varieties to cyclones.** [French summary ¾ p.]

*Rev. agric. sucr. Maurice*, 1958, **37**: 241-51, bibl. 3.

Surveys of damage were made after 2 cyclones which struck Mauritius in 1958. Details of the sampling and marking methods used are described. Tallness and borer attack were factors which increased the damage rate. The varieties surveyed were classified in decreasing order of resistance thus: B.3337, M.147/44, B.37172, M.31/45, M.134/32, B.34104, B.37161 and Ebène 1/37. An estimate is made of the losses sustained by the 1958 crop.

3037. Thomson, G. M.

**The effects of heat treatment on the germination of sugar cane setts.** [French summary ⅓ p.]

*Rev. agric. sucr. Maurice*, 1958, **37**: 235-40.

An experiment is described in which the effects of various factors on germination after heat treatment against ratoon stunting disease were assessed. The treatments were: 2 varieties, 5 temperatures (from 49° to 53° C.), 5 durations (from ½ to 4 hrs), 2 thicknesses of sett and 3 ages of bud. N:Co.310 germinated better after treatment than Co.331. Medium aged buds germinated better than young buds and much better than old. Thick canes

rminated better than thin. Increases of both
nperature and duration of treatment caused
creased germination and these two factors were
t independent. There were significant inter-
tions between the various factors, the more
portant being as follows: variety interacted with
th temperature and duration, Co.331 being more
fected by duration and N:Co.310 by temperature.
oung buds were more affected by duration of
atment than medium. The reduction of germina-
n due to increasing age of buds varied with
riety. Thin canes were less affected by increased
ration than thick. At lower temperatures thin
nes germinated relatively better than thick, but at
gh temperatures the latter were more resistant.
general, depending partly on variety, it seemed
at a length of treatment exceeding 2 hours at a
nperature above 50° C. is likely to affect germina-
n adversely.

38. CHU, T. L., LIU, H. P., AND LO, H. C.
**Downy mildew resistance tests for new sugarcane varieties in Taiwan.** [Chinese, with English summary 1½ pp.]
*Rep. Taiwan Sugar Exp. Stat.*, 1957, No. 16, pp. 1-21, bibl. 11, illus.

sts were conducted for 2 years and included
6 varieties and promising seedlings. Infection
m *Sclerospora sacchari* was most marked in
mmer and developed about 2 months after the
rt of the rainy season. Many varieties proved
hly resistant, including N:Co.310, a variety
eady widely grown.

39. BATES, J. F.
**Developments in weed and pest control in sugar cane in British Guiana.**
*Proc. 1957 Mtg B.W.I. Sugar Tech.*, pp. 100-4.

*eed control:* Although flood-fallowing in British
iana is a major factor in weed eradication,
emical control is needed to supplement it, and,
the compounds tried, 2,4-D has proved the most
tisfactory. Various methods of application are
escribed. *Pest control:* BHC remains the most
idely used insecticide. Experiments with this
mpound and with dieldrin, malathion, chlordane
nd DDT have given some anomalous results,
cluding significant depressions of yield in certain
ses. Endrin and BHC foliar sprays did not
cceed in controlling moth borer (*Diatraea* spp.),
r were biological methods any more successful.
*odent control:* The use of bacteria, repellents and
sect parasites has not proved practicable, but
elleted thallium sulphate has shown promise.
H.L.

40. SCARAMUZZA, L. C.
**Biological control of the sugarcane borer in Cuba.**
*Sugar J.*, 1959, **21** (8): 45-7.

Increasing the population of *Lixophaga diatraeae*, parasitic on *D. saccharalis*, by rearing large numbers in the laboratory for subsequent release, reduced the extent of infestation by *Diatraea* and increased yields in 2 plantations.

3041. NEATE, D. J. H.
**A note on the use of Trithion in frog-hopper control.**
*Proc. 1957 Mtg B.W.I. Sugar Tech.*, pp. 190-2.

Compared with malathion, Trithion gave a slower initial kill but was still effective 72 days after application. Froghopper populations had risen in both the malathion and control plots after 72 days.—Caroni Ltd., Trinidad. H.L.

3042. JENSEN, H. J., AND OTHERS.
**Nematodes associated with varietal yield decline of sugar cane in Hawaii.**
*Plant Dis. Reptr*, 1959, **43**: 253-60, bibl. 10, illus.

In Hawaii 8 genera of plant parasitic nematodes were found in association with sugar cane, and 3 of these (root-knot, root-lesion and spiral) are considered to be of particular importance. Considerable damage is caused by direct feeding, but injury resulting from secondary infection may be even more severe. Sugar cane seedlings were found to be useful indicators of nematode injury. In comparison with earlier surveys, the results from this survey show that some natural enemies have disappeared, that populations of some species have increased and others decreased, and that there is a wider distribution of the 8 potential nematode pests of sugar cane. Soil fumigation tests have given erratic, though in some cases promising, results.—Ore. St. Coll., Corvallis, and H.S.P.A. Exp. Sta., Honolulu.

3043. CHU, H. T., AND TSAI, T. K.
**A preliminary study on the effect of soil fumigation on the growth of sugar cane.** [Chinese, with English summary ⅔ p.]
*Rep. Taiwan Sugar Exp. Stat.*, 1957, No. 16, pp. 73-9, bibl. 5, illus.

Soil fumigation caused increases in the number of tillers per stool and in length and diameter of stalks. Sugar yields were increased 2- to 3·5-fold by fumigation. In descending order of effectiveness were Ortho-fume 85, methyl bromide, Chlorofin 22 and Agrosan GN 5. In pot experiments, in which the soil was sterilized by dry heating, growth was even better.

3044. SMITH, N. M.
**The Scott harvester.**
*Cane Grs' quart. Bull.*, 1959, **22**: 106-7, illus.

This is a blade harvester which cuts and bundles one row at the same time as it tops the next row. The cutter is a shear blade set in front of the tractor, and the topper is driven from the power take-off and worked by an operator at the rear. The tops are deposited in a row between the heaps of harvested cane.

3045. BARRIE, A. G.
**Varietal differences in post-harvest cane deterioration.**
*Proc. 24th Conf. Qd Soc. Sugar Cane Tech., 1957*, pp. 133-40, bibl., from *Trop. Abstr.*, 1959, **14**, Abstr. g179.

After burning and cutting, deterioration was evident in loss of weight and in decrease of juice quality chiefly caused by inversion. Some varieties, e.g. Badila, showed little inversion in spite of heavy moisture loss, and this suggests the possibility of breeding varieties resistant to deterioration.

3046. NORTH-COOMBES, F.
Étude comparée de l'économie du transport des cannes à Maurice. (**Comparative study of the economics of cane transport in Mauritius.** [English summary ½ p.]
*Rev. agric. sucr. Maurice*, 1958, **37**: 217-28.

During the past 11 years rail transport of cane has been halved and road transport increased 3-fold. It is recommended that diesel locomotives should replace steam and that railway lines should be confined to the vicinity of the factory. For road transport tractors and trailers, and 7–8-ton diesel lorries with automatic loading systems, should replace smaller petrol units.

3047. ELLIS, T. O., ROHRIG, P. E., AND ARCENEAUX, G.
**Tests of varietal milling qualities at Romana during 1957.**
*Proc.* 1957 *Mtg B.W.I. Sugar Tech.*, pp. 62-72, bibl. 4, and *Jamaica Ass. Sugar Tech. J.*, 1957, **20**: 20-6, bibl. 5.

The results obtained by milling tests in the Dominican Republic on 24 varieties agreed with those from Louisiana and Cuba, in showing highly significant varietal differences in the characteristics affecting the expected sugar yield from primary juice analysis. Varietal correction factors have been worked out to allow for these differences, using P.O.J. 2878 as the standard, and only two varieties exceeded that standard. The negative correlation between fibre content and this factor was not found to be high enough to permit the use of this characteristic as a guide to performance. The same applied to the bagasse: cane ratio and to the furfural content of the bagasse. H.L.

### *Tea.*

(*See also* 3068f, r, s, 3069q, s.)

3048. DEUSS, J. J. B.
La culture et la fabrication du thé. (**The culture and manufacture of tea.**)
*J. Agric. trop. Bot. appl.*, 1958, **5**: 238-73, 429-53, 557-88, illus.

This full account of tea production deals with the history of tea, its introduction into various countries and the types and quantities now grown in them, the botany of the plant, and the climate and soils it needs. Propagation, including vegetative propagation, is described, also nursery technique, transplanting, manuring with green manures and fertilizers, pruning, plant protection, conventional and mechanized harvesting, and varietal selection. The chemistry of tea is dealt with and the last section covers tea manufacture in some detail.

3049. NYASALAND.
***Annual Report of the Tea Research Station 1957-58,*** Mlanje, 1958, pp. 25.

Progress reports are made on a wide range of experiments including: *Nursery experiments:* Soil moisture changes under nursery beds were studied; older seedlings appear to require more watering than younger; wilting and loss were greatest when seedling root systems were deficient in starch. *Survival of young tea:* Spacing, fertilizer and shade tree experiments; there were more losses at closer espacement, and increased N did not protect the plants from the effects of close spacing. *Soil moisture studies:* Movements of moisture under mature tea showed that pruning aided moisture conservation. The cover crop *Stylosanthes gracilis* markedly reduced soil moisture. *Pruning experiments:* Including the interaction between pruning and N applications. *Tipping experiments:* There were no significant yield differences due to tipping height. *Fertilizer experiments:* Numerous trials are reported mainly showing responses only to N, and possibly to S in young tea. *Weed killers* and *Spacing:* Experiments are in progress. *Permanent shading:* Tea under no-shade and under *Grevillea* outyielded that under *Gliricidia* and *Albizzia*. The overshading of young tea was detrimental. *Vegetative propagation:* The best results were obtained when cuttings were taken during the dormant period of the source plants, and the worst when these plants were in growth. *Breeding:* Including selection for drought resistance.

3050. WU, C. T., WU, H. K., AND FONG, C. H.
**The distribution of plucking leaf hairs on tea varieties and its correlation with yield and quality.** [Chinese, with English summary ¾ p.]
*J. agric. Ass. China*, 1958, No. 24, pp. 78-82, bibl. 3, illus.

Forty-eight tea varieties were examined for hair length and hair density on the plucking leaves in 1957. Yields were recorded and the quality of both black and Oolong teas made from them assessed. Significant positive correlations were obtained between hair length and Oolong tea quality (1%) and between hair density and black tea quality (5%). The genetics of hair distribution are discussed. H.L.

51. Harada, S., and Nakayama, A.
**The influence of the bud and leaf on root formation in tea cuttings.** [Japanese, with English summary ½ p.]
*Study of Tea*, 1958, No. 19, pp. 1-4, bibl. 5, illus.

servations 110 and 150 days after cuttings were ken showed that root numbers were highest in ttings on which 2 or 3 buds were left, and lowest cuttings from which all buds had been removed. cuttings with one bud, roots were concentrated rectly below the bud. Root number was not ated to the number of leaves left on the cutting. ere was a tendency for root weight to increase leaf number on the cutting increased; this was re marked at 150 days than at 110 days.

52. Harada, S., Watanabe, A., and Kanô, T.
**The influence of parent stock conditions on quality, rooting and growth of tea cuttings.** [Japanese, with English summary ⅓ p.]
*Study of Tea*, 1958, No. 19, pp. 5-13, bibl. 9.

ttings from unpruned parent stocks were weak, d low N contents in stems and leaves, and showed poorest rooting. Cuttings from pruned bushes ted best. Among varieties tested Y3, which had lowest leaf-N content, showed the poorest oting. There was a tendency for cuttings with atively large leaves and stems, and with low m-N contents to grow better than other cuttings.

3. Pačulija, K. F.
**Comparative anatomy of the roots of tea plants propagated vegetatively and by seed.** [Russian.]
*Bjull. Vses. n.-i. In-ta Čaja i subtrop. Kul'tur*, 1956, No. 4, pp. 35-9, from *Ref. Ž.* (*Biol.*), 1958, No. 2, Abstr. 5,573.

hen the root structure of 4-, 8- and 12-month-old nts was compared it was found that the roots seedlings changed over from absorption to duction earlier than those of vegetatively opagated plants. In the roots of seedlings the ntral cylinder occupied more space and the bast as wider and made up of larger cells than in getatively propagated plants. The medullary rays the seedlings were well developed.

54. Lin, C. F.
**An experimental study of erosion and run-off on a yellowish brown gravelly red soil in the Pinchin tea district.** [Chinese, with English summary 2 pp.]
*J. agric. Ass China*, 1958, No. 24, pp. 64-77, bibl. 9, illus.

wo degrees of slope, 17 and 32%, were chosen for is study started in 1954, and 7 treatments were mpared in randomized blocks. The gravel ntents of the slopes differed appreciably, being % by volume on the 17% slope and 20% b.v. on 32% slope. The treatments were: (*a*) control terracing, clean cultivation as in normal tea ming); (*b*) as (*a*) but with simple bench terracing; (*c*) as (*b*) plus selective weeding; (*d*) as (*a*) with straw mulch; (*e*) reverse bench terracing, selective weeding and contour drainage ditches; (*f*) close contour planting of the tea variety Ying-tze-hong-shin, selective weeding; (*g*) as (*c*) plus hillside ditching. Losses were small on both slopes, except in the control and simple bench terraced areas (*a*) and (*b*), but in all cases except the reverse bench terraced area (*e*) both run-off and loss of soil were considerably greater from the 17% slope. On the 32% slope the least run-off occurred with selective weeding (*c*) and the lowest soil loss with (*c*) and straw mulch (*d*). H.L.

3055. Ali-Zade, M. A.
**Changes in the nucleic acid content in relation to bud and shoot growth in tea.** [Russian, with English summary 9 lines.]
*Fiziol. Rast.*, 1959, 6: 48-52, bibl. 14.

During a period of prolonged dormancy in Lenkoran induced by a dry summer, the nucleic acid content of both terminal and axillary growing points showed a marked decrease. Under irrigation the growth period was uninterrupted and the growing points had a high nucleic acid content.

3056. Torii, H., and Ôta, I.
**Preliminary surveys on the diagnosis of the tea plant by foliar analysis.** [Japanese, with English summary ¾ p.]
*Study of Tea*, 1958, No. 19, pp. 85-93, bibl. 2.

The mineral constituents of mature tea leaves, sampled once a month from 2 varieties, generally reached a high level in the autumn, then declined and remained constant throughout the winter. Samples of winter old leaf, spring young leaf and spring old leaf of Yabukita varied widely in $P_2O_5$, CaO and MnO depending on region of origin, but differences in N and ash were small. The winter old leaf is recommended as a sample for N or CaO determinations, but any leaf is suitable for MnO and $K_2O$. Significant correlations were found between the N, MnO and $P_2O_5$ contents of soil and leaves. Plants whose winter leaves lost N between winter and spring produced a spring flush with a low N content. The contents of N, $P_2O_5$ and $K_2O$ were highest in young leaves, and those of CaO and MnO in old leaves, while ash contents were lowest in winter old leaves. In comparing leaf samples from 3 varieties, varietal differences in N and ash were small, but differences in MnO and CaO were large. Studies with young leaves showed that $P_2O_5$, $K_2O$ and CaO contents remained fairly constant during the first 5 days of growth.

3057. Gusejnov, R., and Mirzojan, A.
**The effectiveness of different rates of phosphorus on the tea plantations of the Lenkoran-Astarinsk region.**
*Soc. S.H. Azerbajdzana*, 1957, No. 4, pp. 26-9, from *Ref. Ž.* (*Biol.*), 1958, No. 5, Abstr. 20,540.

In a complete fertilizer 180 kg./ha. of $P_2O_5$ produced the highest yield. $P_2O_5$ at 90 and 180 kg./ha. increased the content of tannins and extractives in the green leaf and reduced the total and soluble N when compared with 540 kg./ha. $P_2O_5$. Leaf of the July plucking was richer in tannins and extractives than that of the May plucking.

3058. Kutubidze, V. V.
**Intravarietal artificial supplementary pollination of tea with mixed pollen.** [Russian.]
*Agrobiologija*, 1958, No. 4, pp. 53-6.

In Georgia supplementary pollination with mixed pollen from 10–15 plants of the same variety increased fruiting by 143·2–194·4% and the weight of fruit capsules by 210·5% compared with open pollination. The yield of standard seed was 50·1% as against 44·8%. In open pollinated tea the number of seeds per kg. was 763·2, their absolute weight [per 1,000 seeds] 1,322·4 g. and length 13·5 mm., while in artificially pollinated tea the figures were 716·9 seeds, 1,402·3 g. and 13·9 mm., respectively. Germination of both lots was similar in the laboratory, but in the field it was higher in seeds from artificially pollinated plants.

3059. Hvitija, R. A.
**Supplementary pollination with mixed pollen in tea seed production.** [Russian, with English summary.]
*Bjull. Vses. n.-i. In-ta Čaja i subtrop. Kul'tur*, 1957, No. 1, pp. 76-82, from *Ref. Ž.* (*Biol.*), 1958, No. 5, Abstr. 20,538.

Seed yields and quality were studied in the No. 6 Chinese variety of tea, using the pollen of Chinese, Indian and Japanese teas. Self-pollination in isolation resulted in 2·2% fruit set, open pollination in 7·3%, pollination with mixed pollen from 10 bushes 11·5% and from many bushes 12·7%, pollination with mixed pollen of different varieties 15%, and pollination with mixed pollen of related species 17·9%. Seed quality was also improved by the use of mixed pollen.

3060. Takahashi, T., and others.
**Studies on frost damage of tea (Part 3). The prevention of frost damage by a wind machine.** [Japanese, with English summary $\frac{1}{3}$ p.]
*Study of Tea*, 1958, No. 19, pp. 14-22, bibl. 7, illus.

A wind machine plus heaters effectively destroyed the inversion layer above a tea garden. The amount of dew in the tea garden was also reduced by the artificial wind. The temperature effect of the wind machine had disappeared 9 minutes after it stopped running.

3061. Glover, P. M.
**Developments in power spraying.**
*Two and a Bud*, 1958, **5** (4): 11-15.

The practical difficulties of spraying tea are discussed. Economic and effective spraying can be done, however, using either tractor mounted power sprayers in which the fluid is fed to the lances under pressure, or portable aerosol sprayers in which a 2-stroke motor drives a high speed centrifugal fan at 30,000–40,000 r.p.m. producing an air blast of 350 ft. per sec. The possibilities of aerial spraying in tea are considered.

3062. Kibushi, H., and Ezuka, A.
**Control of tea blister blight with various fungicides (Part 2).** [Japanese, with English summary 8 lines.]
*Study of Tea*, 1958, No. 19, pp. 23-7, bibl. 2.

As in earlier trials [*H.A.*, 27: 2982] copper fungicides were highly effective against blister blight, and non-copper sprays were less effective. Dusts require further investigation.

3063. McTear, I.
**Field mechanisation.**
*Two and a Bud*, 1958, **5** (4): 5-8.

Progress in the development of a suitable machine for harvesting tea is reviewed. A straddle type, wheeled vehicle travelling at 1·25 m.p.h. is considered most suitable, and it may be used in addition for mechanical pruning and spraying.

3064. Barua, D. N.
**Growth of the tea bush in relation to mechanical harvesting.**
*Two and a Bud*, 1958, **5** (4): 9-10.

Present experience with mechanical plucking has shown that low tipping followed by a gradual rise in the plucking level is better than plucking at a constant height. The lower the tipping the better the quality and quantity. The rise in plucking level using machines has been greater than with hand plucking, and approximately twice as many new leaves are left in machine-plucked plots as in hand-plucked. Better results with machine plucking may be expected with clonal tea than with less uniform commercial seedlings.

3065. Kawai, S., and Ishigaki, K.
**The radioactivity of tea.**
*Res. Effects and Influences Nuclear Bomb Test Explosions. I. Ueno, Tokyo*, 1956, pp. 709-15, from *Ref. Ž.* (*Biol.*), 1958, No. 2, Abstr. 5,958.

Determinations of radioactivity following an H-bomb test were made on tea leaf, tea infusion, mulch and soil. All leaves were radioactive, and during prolonged boiling about half of the radioactive substances passed into the infusion. The radioactivity of the leaves of other crops intercropped with tea (soya bean, sweet potato, radish, etc.) was higher than that of tea.

### *Sundry crops.*

(*See also* 3068e, h, 3069c.)

3066. Fitting, K. O., and Miller, C. D.
**Variation in the ascorbic acid content of individual fruits of the acerola.**
*Hawaii Fm Sci.*, 1958, **7** (2): 7, illus.

e ascorbic acid values for individual fruits from e tree varied from 1·33 g. to 2·56 g./100 g. The corbic acid content tended to decline as the ight of the fruit increased. The moisture content the fruit ranged from 88·3 to 92·5% in samples om 5 trees.

67. Dikshit, N. N.
**Hormone-induced parthenocarpy in *Annona squamosa* Linn., custard apple.**
*Indian J. Plant Physiol.*, 1958, **1**: 54-7, bibl. 4.
**Initial stages of parthenocarpy in custard apple (*Annona squamosa* Linn.) following treatment with 2,4,5-trichlorophenoxy acetic acid.**
*Sci. and Cult.*, 1959, **24**: 381-2, bibl. 3, illus.
e initial stages of parthenocarpy were induced applying 0·3 to 0·9% 2,4,5-T in lanolin to the wer buds after removal of the stigmas, but the sulting fruits were small and deformed. Other owth substances tested were less effective. educing the number of leaves on the shoot ghtly diminished the size of the parthenocarpic uit, and treating the buds in July, rather than in pril or May, slightly increased it.—Citrus Die-ck Scheme, Gonikoppal, Coorg.

### *Noted.*

8.

a Anon.
**Direction and slope of tapping cut.**
*Plant. Bull. R.R.I.M.*, 1959, No. 41, pp. 42-3.
Summarized recommendations are for left to right sloping cuts, 25° from the horizontal for seedling, and 30° for budded, trees.

b Anon.
**Prevention of coagulation in the field.**
*Adv. Circ. Rubb. Res. Inst. Ceylon* **61**, 1958, pp. 4.
Advice on the choice and application of anticoagulants.

c Anon.
**Rock phosphate versus superphosphate.**
*Plant. Bull. R.R.I.M.*, 1959, No. 41, pp. 34-6.
Equally effective for rubber on acid soils.

d Anon.
**RRIM 600 series clones.**
*Plant. Bull. R.R.I.M.*, 1959, No. 41, pp. 28-33.
An interim report on performance: the 5 most promising remain unchanged.

e Anon.
**Simple machine will aid cashew nut industry.**
*E. Afr. Trade Ind.*, 1958, **5** (10): 37, illus., from *Trop. Abstr.*, 1959, **14**, Abstr. g1005.
Description of a simple nut-opening machine costing about Sh. 200/–.

f Berdikovskaja, N. P., and Vil'činskij, N. M.
**Green manuring increases the frost resistance of tea.** [Russian.]
*Udobrenie i Urožaj.* 1957, No. 1, pp. 45-7, from *Ref. Ž.* (*Biol.*), 1958, No. 5, Abstr. 20,539.
Notably following the use of blue lupins or peas plus minerals.

g Bocquet, M.
Quelques considérations sur la densité et le dispositif de plantation à adopter pour le caféier robusta. (**Some considerations on the planting density and lay-out to use with robusta coffee.**)
*Café, Cacao, Thé*, 1958, **2**: 111-18, illus.
Triangular or quincunx planting at 2·5 to 3·5 m. espacement recommended.

h Bodard, M., and Pujol, R.
Sur deux *Cola* mal connus de Guinée française. (**On two little known *Cola* spp. of French Guinea.**)
*J. Agric. trop. Bot. appl.*, 1958, **5**: 589-92, bibl. 7, illus.
Descriptions of *C. simiarum* and *C. nitida* subsp. *pallida*.

i Bonnier, C., and Seeger, J.
Symbiose *Rhizobium*-Légumineuses en région équatoriale. (***Rhizobium*-Leguminosae symbiosis in the equatorial region.**)
*Sér. sci. Inst. nat. Ét. agron. Congo belge* **72,** 1957, pp. 67, bibl. 40, illus., 60 fr. belg., and **76,** 1958, pp. 66, bibl. 19, illus., 80 fr. belg.
A comprehensive treatise, including isolation, culture and inoculation techniques as applied to tropical cover crops.

j Butani, D. K.
**Sugarcane mites—a review.**
*Proc. Indian Acad. Sci., Sect. B*, 1959, **49**: 99-107, bibl. 48, illus.
Including reported methods of control.

k Carmichael, W. W.
**Observations of cold damage to mangos in Dade County and the lower West Coast.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 333-5.
Varietal susceptibility and protection by sprinkler irrigation.

l Carvalho, A.
**Preliminary information on the genetics of Ethiopian coffees.**
*Nature*, 1959, **183**: 906, bibl. 4.
Observations on arabica types collected in Ethiopia and grown in Brazil.

m D[as], G. M.
**Psyllid affecting shade tree plants in nurseries.**
*Ser. Tea Res. Inst. Tocklai* **99/1**, 1958, pp. 3.
Control measures against psyllids on *Albizzia odoratissima* seedlings.

n DUBLIN, P.
Biologie florale du *Coffea dewrevrei* de Wild., race *excelsa* A. Chevalier. II^e partie: Mégasporogénèse et étude du gamétophyte femelle. (**Floral biology of *C. dewrevrei* var. *excelsa*. Part II. Macrosporogenesis and a study of the female gametophyte.**) [English and Spanish summaries ½ p. each.]
*Agron. trop.*, 1958, **13**: 704-31, bibl. 62, illus.
For Part I see *H.A.*, 28: 1876.

o ENTWISTLE, P. F.
**Mealybugs IV—their relationship to swollen shoot disease of cocoa in Ghana.**
*Ghana Fmr*, 1958, **2**: 129-33, illus.
The origin and spread of viruses. [For Part III, see *H.A.*, 29: 1982m.]

p GANGOLLY, S. R., SATYABALAN, K., AND PANDALAI, K. M.
**Varieties of the coconut.**
*Indian Coconut J.*, 1957, **10** (4): 3-28, bibl. 48, illus., [received 1959].
Short descriptions of varieties from the major producing countries.

q GAROT, A., AND SUBADI, —.
Tanaman tjoklat dibawah kelapa dikebun P.P.N. Balong. (**Planting cacao under coconuts on the P.P.N. estate at Balong.**) [English summary 18 lines.]
*Menara Perkebunan*, 1958, **27**: 297-8.
A short account of an apparently successful project in Central Java.

r G[LOVER], P. M.
**Organisation of spraying [in tea].**
*Ser. Tea Res. Inst. Tocklai* **93/2**, 1958, pp. 7.
Including suitable types of sprayers, valves and nozzles.

s GUPTA, P. N. S., AND OTHERS.
**Analytical variations of Indian tea.**
*J. Inst. Chem. India*, 1958, **30**: 142-52, from abstr. in *J. Sci. Food Agric.*, 1959, **10**: i-156.
In teas from 60 estates in 7 producing areas.

t HALAIS, P.
Besoins quantitatifs de la canne en azote d'après le diagnostic foliaire. (**The quantitative nitrogen needs of sugar cane according to foliar diagnosis.**) [English summary ¼ p.]
*Rev. agric. sucr. Maurice*, 1958, **37**: 202-6, bibl. 2.
N needs of varieties B.37172 and Ebène 1/37 as determined from N index.

u HUGHES, C. G.
**A miscellany of sugar-cane diseases.**
*Tech. Commun. Qd Bur. Sugar Exp. Stats* **1**, 1958, pp. 20, bibl. 8, illus.
Descriptions of several diseases, not yet named, under observation at the Bureau Pathology Farm.

v HUGOT, E.
Critère et formule de comparaison entre champs, parcelles, variétés ou traitement de cannes. (**Criterion and formula for comparing fields, plots, varieties or treatments of sugar cane.**) [English summary ¼ p.]
*Rev. agric. sucr. Maurice*, 1958, **37**: 212-16.
A formula in which net profit replaces recoverable sugar per unit area as a criterion.

w INNES, R. F.
**Regression analysis as applied to some control data in raw sugar factories.**
*Jamaican Ass. Sugar Tech. J.*, 1957, **20**: 55-71, bibl. 12.
Including the relationship between Java ratio and fibre % cane.

x IYENGAR, B. N.
**Economics of coffee production and manuring.**
*Indian Coffee*, 1959, **23** (1); 24-7, 29.
Basic dressing of 50 lb. N, 75 lb. P, 100 lb. K per acre, or more in these proportions, with lime on acid soils recommended.

y KING, N. J.
**The Massey-Ferguson harvester.**
*Cane Grs' quart. Bull.*, 1959, **22**: 102-3.
Comments on a machine which cuts the cane into short lengths.

z KIRTHISINGHE, J. K. F.
**Biological control of the coconut caterpillar.**
*Ceylon Coconut Quart.*, 1958, **9**: 51-3, illus.
An account of rearing *Trichosphilus pupivora* wasps, pupal parasites of *Nephantis serinopa*.

3069.

a MESTIER, J. J. E., AND TURNER, P. E.
**Sugar-cane agriculture in St. Kitts.**
*Proc. 1957 Mtg B.W.I. Sugar Tech.*, pp. 80-4, bibl. 9.
A general review, covering climate, methods of cultivation, pest control and yields.

b MINER, J. T., AND ZILL, L.
**Cold damage to mangos in Palm Beach County.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 335-8.
Many varieties did not set fruit at temperatures below 45° F.

c MORTON, J. F.
**The tamarind (*Tamarindus indica* L.), its food, medicinal and industrial uses.**
*Proc. Fla St. hort. Soc., 1958*, 1959, **71**: 288-94, bibl. 80, illus.

d NAUNDORF, G.
Neue Düngungsmethoden beim Kakao. (**New methods of manuring cacao.**)
*Gordian*, 1959, **58** (1398): 9-11, bibl. 24.
A review of work on foliar nutrition carried out in Colombia.

e PANDALAI, K. M., AND MENON, K. P. V.
**On the use of potash as a fertiliser with its effect on yield, quality and disease resistance in the coconut palm.**
*Indian Coconut J.*, 1957, **10** (3): 12-28, bibl. 42, [received 1959].
A review of experimental work in India and Ceylon.

f PARK, M.
**Peasant sugar cane production in Antigua.**
*Proc. 1957 Mtg B.W.I. Sugar Tech.*, pp. 93-5.
Notes on the inauguration of the Peasant Development Organization and the role of cane in the scheme.

g PEREIRA, J., Jr.
Despolpamento e produção de cafés de fino paladar. (**Depulping and production of choice flavoured coffees.**)
*Rev. Agric. Piracicaba*, 1958, **33**: 229-40, bibl. 9.
Recommendations on harvesting and processing.

h PIRES, J. A.
**Leaf scald disease in British Guiana.**
*Proc. 1957 Mtg B.W.I. Sug. Tech.*, pp. 146-59, bibl. 32.
*Xanthomonas albilineans* and the use of immune varieties. [See also *H.A.*, 29: 961c.]

i RAMOS NUÑEZ, G.
El cultivo de la caña de azúcar en el Valle del Cauca. (**Sugar cane growing in the Valle del Cauca [Colombia].**)
*Agric. trop. Bogotá*, 1958, **14**: 483-505, bibl. 7, illus.
Soils, planting, irrigation, weed control, cultivation and harvesting.

j RUBBER RESEARCH INSTITUTE OF MALAYA.
***Annual Reports 1953, 1954 and 1955,*** pp. 93, 93 and 85, each 3 dollars, [received 1959].
Back numbers, previously of restricted circulation, are now being issued.

k SPENCE, J. A.
**Incidence of leaf scald disease of sugar cane in the West Indies.**
*Proc. 1957 Mtg B.W.I. Sugar Tech.*, pp. 140-6, bibl. 19.
With notes on varietal susceptibility.

l SPRIESTERBACH, H.
Rohkakao von A-Z. (**Raw cacao from A-Z.**)
*Gordian*, 1957 and 1958, Vols. **57** and **58**, Nos. 1363 to 1386, pp. 2 in each number.
A dictionary of cacao, with emphasis on the areas where the crop is grown.

m STEVENSON, G. C.
**The British West Indies Central Sugar Cane Breeding Station—twenty-five years' progress.**
*Proc. 1957 Mtg B.W.I. Sugar Tech.*, pp. 24-33.
A review, with emphasis on the development of disease-resistant varieties.

n TAN HONG TONG, AND HELLE, C. F.
Aanwijzingen voor het oogsten, bewaren, verzenden en uitleggen van heveazaden. (**Directions for the harvesting, storage, dispatch and germination of hevea seeds.**) [English and Indonesian summaries 1¼ pp. each.]
*Ber. Alg. Proefst. AVROS, Medan*, **19**, 1958, pp. 15, bibl. 14.

o TIXIER, P.-P.
La latex d'hévéa. Physiologie et physiopathologie des conditions de sa production. (**Hevea latex. Physiology and phytopathology of its production.**) [English, German, Spanish and Italian summaries ½ p. each.]
*Rev. gén. Caoutch.*, 1959, **36**: 73-9, bibl. 32, illus.
A review, including details of brown bast disease and latex stimulation.

p TURNER, P. E.
**Sugar estate agriculture in Antigua.**
*Proc. 1957 Mtg B.W.I. Sugar Tech.*, pp. 85-92, bibl. 3.
A survey with emphasis on soils and soil management.

q VISSER, T., AND KEHL, F. H.
**Selection and vegetative propagation of tea.**
*Pamphl. Tea Res. Inst. Ceylon* **3**, 1958, pp. 15, illus., and reprinted in *Tea Quart.*, 1958, **29**: 76-86, illus.
Practical advice on selection, propagation by cuttings and treatment of rooted plants.

r WIEHE, P. O.
Le problème des variétés de cannes à Maurice. (**The problem of sugar cane varieties in Mauritius.**) [English summary ⅓ p.]
*Rev. agric. sucr. Maurice*, 1958, **37**: 194-201, bibl. 13.
A review of changes over the past 125 years and recent developments.

s WIGHT, W.
**Dormancy in relation to plucking and pruning of the tea plant.**
Reprinted from *Phytomorphology*, 1955, **5** (1): 1-11, bibl. 7, illus., [received 1959].
An essay on the *banjhi* or dormant condition.

t WILLIAMS, J. R.
**A summary of entomological and related problems of sugar cane in Mauritius.** [French summary ⅓ p.]
*Rev. agric. sucr. Maurice*, 1958, **37**: 229-34.
The stalk moth and other moth borers, leafhoppers, white grub and various soil pests.

u WOLF, J.
**Development and structure of the world banana market.**
*Mon. Bull. agric. Econ. FAO*, 1959, **8** (2): 9-18, bibl. 12.

v WRIGHT, N.
**Fighting the cocoa capsid in Ghana.**
*World Crops*, 1959, **11**: 99-101, bibl. 4, illus., and 147-8, bibl. 1, illus.
Yield increases due to use of gamma-BHC, and ambitious programme of control.

## NOTES ON BOOKS AND REPORTS.

### *Books.*

3070. ATKINS, F. C.
*This mushroom business.*
Faber & Faber, London, 1959, 8½×5½ in., pp. 107, illus., 18s.

This is not a textbook on mushroom growing but rather a short history of the mushroom industry in Britain during the period 1945–1958. It takes the form of a collection of articles and letters written by the author during those years, which, by means of a skilfully written commentary, has been woven together to form a continuous narrative. The period covered by the book was one of rapid change and expansion in the industry and the range of topics discussed is wide; indeed, there is probably no one better qualified than the author to write about so many different aspects of the mushroom business.

Immediately after the war growers were faced with many problems which could not be solved without co-operative effort. This situation resulted in the formation of the Mushroom Growers' Association and the Mushroom Research Association, in which the author took a leading part. Thus began the gradual breakdown of the secrecy, which had surrounded mushroom growing in the past, and this process culminated in the organization of the first International Conference on Mushroom Science. The author demonstrates vividly how, in mushroom growing, some problems are almost permanent, while others, mostly connected with pests and diseases, may be serious in one year and almost non-existent in the next. The problem of obtaining suitable compost and casing material is a constantly recurring theme, but the methods advocated for achieving this have varied from year to year. The fluctuating importance of different pests and diseases is demonstrated most effectively. "Dactylium year and 1951–2 topics" is the heading of one chapter, and "Catastrophes of 1957: diseases described" is another. Almost every year has produced a new danger, a situation which makes long-term planning of research very difficult.

Two of the most useful chapters discuss the preparation of synthetic compost (reprinted from the 1951 MRA Report) and compare the symptoms of fusarium disease, mummy disease and La France disease. In the latter chapter the author attempts to clarify the chaotic situation which arose in 1957 during the outbreak of an unidentified disorder which produced symptoms similar to those found in all three diseases. That he does not altogether succeed is not surprising in view of the serious lack of information, based upon sound research, about these disorders.

Much of the value of this book lies in the information which it gives on aspects of the mushroom industry which are not covered by conventional manuals on mushroom growing. There are notes, for example, on the structure and working of tariff agreements, the cost of publicity and prepacking problems. Naturally, it is not possible in a book of this size for the author to discuss his topics in much detail, but he puts before his readers the salient facts, and his accompanying comments, based as they are on wide experience, are always pertinent. To sum up, if the reader wants to learn how to grow mushrooms, he should consult the author's other book, "Mushroom growing today" [*H.A.*, 21: 1188], but, if he thinks he knows how it is done, a perusal of this book will make him pause and think again. D.G.G.

3071. BOHN, R.
*Die Technik im Gartenbau.* **(Mechanization in horticulture.)**
Eugen Ulmer, Stuttgart, 2nd edition, 1959, 8×6½ in., pp. 324, bibl. 53, illus., DM 18.80.

The early appearance of the second edition—two years after the first—is evidence of the demand for a comprehensive manual on mechanization in horticulture and shows that the author has met the needs of readers enquiring into this field. After an introductory section on the use and testing of machinery and on technical courses for gardeners, the book deals in turn with glasshouses and frames, glasshouse heating, irrigation, implements for soil cultivation, aids in the raising and culture of plants, and transport. All the equipment described and extensively illustrated has been tested and approved by the DLG (German Farmers' Union). Names and addresses of the manufacturers are listed.
V.H.G.

3072. EDWARDS, R. G.
***The Australian garden book.***
Angus & Robertson, Sydney and London, 2nd edition, 1958, 10×7½ in., pp. 322, illus., 45s.

Although not arranged as such, this book in this new and exhaustively revised edition is a real encyclopaedia of gardening under Australian conditions. Considering that it has to cope with a tinent, and consequently with a diversity of nates, the work is wonderfully complete. The ic principles of gardening are much the same rywhere, and the first eight chapters are devoted these. The latest methods of weed and pest trol as developed overseas are given attention. es, flowering shrubs, and decorative flowering nts including bulbs, roses and carnations, each e chapters to themselves. Annuals, which seem e a general stand-by in adversity, are given the treatment and are listed under 25 different dings covering, one would think, every con- vable situation or requirement. Their common nes, heights and planting distances are noted. notated lists of trees and shrubs are interesting to the gardener in England will be a source of y, for, besides Australian natives, most of which has always regarded as hopeless from the start, ge numbers of his carefully nurtured greenhouse nts here flourish with abandon in the open, nitely taking no heed for the morrow. The tion on vegetable gardening is comprehensive. at on fruit pays attention to pests, diseases and pagation, though it is a trifle sketchy on choice varieties, perhaps because anything grows.

book is well illustrated with useful drawings some coloured plates. The plate facing p. 170 porting to represent *Cheiranthus allionii*, the iant orange "Siberian wallflower", shows one the ordinary chestnut-coloured garden wall- vers, an obvious slip. These things will happen, detract little from the value of the book. y serious Australian gardener will want it, any gardener new to the country and hoping ttle will just have to have it. G.St.C.F.

3. EVISON, J. R. B.
*Gardening for display.*
Collingridge, London, 1958, 9×6 in., pp. 200, illus., 35s.

author is Superintendent of the Parks and rdens of Brighton and is responsible for the ctacular displays of spring and summer bedding nts, which are one of the great attractions of the vn. The book is in two parts. Part I deals with routine management of flower beds, the tivation from seed of half-hardy annuals and nnials and the propagation of perennials from tings. The use of bedding plants in tubs, vases window boxes is also discussed. A chapter on ts and diseases gives concise lists of the most dely used bedding plants with the symptoms of ack and protective measures. Notes are also luded on the application of up-to-date insecti- es and fungicides and the range of pests or eases controlled by each. Details of well over ee hundred bedding schemes are given, including ging and dot plants as well as plants for the pet and main display. These have either been d by the author, or are schemes he has noted as worthy of repetition. Their immense range and variety cater for all tastes, whether one's preferences are for colours blended or contrasted, for the subtle or the startling.

Part II consists of an encyclopaedia of nearly two hundred genera, giving notes on their propagation and cultivation together with the best species and varieties for bedding purposes. Many of the less common plants used for foliage effects in summer bedding are illustrated by clear line drawings. The twenty-four black and white photographs are well chosen to illustrate various points of design and also show what should be avoided. There has for years been a dearth of good books on this subject, and Mr. Evison's contribution will surely become the standard handbook for both the professional and amateur. M.C.S.

3074. HARTMANN, H. T., AND KESTER, D. E.
*Plant propagation: principles and practices.*
Prentice-Hall, New York and New Jersey, 1959, 9×6 in., pp. 559, bibls and illus. both numerous, $8.75.

This is offered as a major contribution to the propagator's extensive library, and, although the shelves are already overfull, it will certainly shoulder itself a place. Both authors are experienced tutors of horticultural students and in consequence have given us a fine textbook, clearly written, concise and taking nothing for granted; even "heeling in" is explained in detail. This careful teaching will suit the amateur also, although this book is not a horticultural encyclopaedia but is concerned with principles and practices, both of which are considered in great detail in alternate chapters. This deliberate arrangement might suggest a discrete avoidance of the juxtaposition of numerous disturbing divergencies, but in reality it makes for clarity and is really the best way of doing it.

The eighteen chapters are placed in four divisions: general aspects; sexual propagation; asexual propagation; and the propagation of selected plants. The bulk of the book is taken up with the two great propagation methods. The first section serves to introduce the subject and provide basic botany and cultivation "know how". The final section deals with special techniques suited to each of the principal fruit and nut species, ornamental trees, shrubs and climbers, herbaceous perennials and annuals. These chapters are not just extended catalogues but really get down to the appropriate methods for such plants as the apple and azalea, magnolia and mango, wistaria and walnut. The two middle sections, five chapters on sexual and seven on asexual propagation, are most excellently done and are right up to date; it would be difficult to name any book that does them better. The importance of the testing, selection, and maintenance of healthy clones is stressed, and the vital necessity for continuing the re-examination of source plants for both health and trueness to type is underlined. Mutation dangers and the curious habits of chimaeras are revealed, and it is clear that the reader can no longer regard vegetative propagation as a peaceful haven of rectitude. It is a pity, however, that the authors have not used the term "source plant" in preference to "mother tree", which misleadingly suggests a sexual relationship within the vegetative clone.

In collecting material for their book the authors have, perhaps too politely, accepted the findings of others, whereas it would have been refreshing to have had more of their personal views, particularly where there are clear conflicts involving major conceptions of principle. For example, research workers in the twenties and thirties found that a high C/N ratio and ripeness were vital factors in the rooting of cuttings, whereas nowadays the emphasis is on succulence, sensitivity and juvenility. The authors deal faithfully with all these contradictions, but, in short, they seem reluctant to argue in front of their students; a pity!

The index is attractively definite in referring to one, or at most two pages, unlike the intimidating chains of numerals so often seen. The extensive bibliographies are placed at the end of each chapter; there are, for instance, no less than 162 references for the one chapter on the anatomical and physiological basis of propagation by cuttings. There are also book lists for supplementary reading, all very carefully selected.

It is, indeed, an excellent piece of work, and the reviewer only wishes he could afford to buy a personal copy. R.J.G.

3075. Krüssmann, G.
*Handbuch der Laubgehölze. 1. Lieferung. Band 1. Bogen 1–6.* (**Handbook of broad-leaved trees and shrubs. Vol. 1, Part 1, Sections 1–6.**)
Paul Parey, Berlin, 1959, 11×7½ in., pp. 96+8 plates, DM. 18.60.

It is intended that 11 further parts should follow Part I at about quarterly intervals until the two volumes of the handbook are complete. As a dendrologist Krüssmann has an international reputation and is well known as an author and as the editor of *Deutsche Baumschule*. In his main purpose —the description of species arranged in alphabetical order of genera, with special reference to utilization, requirements, hardiness, etc.—he does not confine himself to trees grown in Germany, but considers all trees and shrubs hardy in Europe. Synonyms are added to the names, and the latest rules on nomenclature are followed. Part I opens with some general chapters, including a list of famous botanists and gardeners together with biographical data, and therefore does not take us further than the genus *Acacia*. However, it can already be said that we have here the beginning of an indispensable reference book that everybody connected with nurseries, parks or landscape gardening ought to acquire. A high standard has been achieved in respect of the photographic illustrations, and a great number of excellent line drawings also support both the introductory and the systematic sections. V.H.G.

3076. Levitt, J.
***Protoplasmatologia. Band VIII. Physiologie des Protoplasmas. 6. Frost, drought and heat resistance.***
Springer-Verlag, Vienna, 1958, 10×7 in., pp. 87, bibl. pp. 8, Sch. (Austrian) 186, $7.40 or 53s.

Apart from the fifth chapter, which is devoted to animals, the whole of this work is concerned with plants. The author provides an extensive review of the literature in 8 chapters with the following headings: Terminology; Quantitative aspects of environment resistance; The nature of the defense mechanisms; Frost resistance; Frost resistance in animals; Drought resistance; Heat resistance; and the Relation between frost, drought and heat tolerance. Many of the references cited concern horticultural crops. A short subject index is provided.

3077. Martin, H.
***The scientific principles of crop protection.***
Edward Arnold, London, 4th edition, 1959, 9×6 in., pp. 359, bibls numerous, 65s.

So much has happened since the 3rd edition appeared in 1940 that one despaired of the author producing a 4th edition, or, if he did, of it being in less than three volumes. But another edition has appeared, and runs to fewer pages (359) than before (385). This economy has been achieved in part by increasing page size slightly, without any appreciable reduction in type size and therefore of clarity. But although the pattern of chapters, and indeed titles, remains almost unchanged, the space allocated to topics has been changed to suit the new relative importance of each. Chapters increased in size are those on "weedkillers" and "the measurement and mechanics of toxicity" and the two on organic insecticides. Chapters markedly reduced in size include the general chapter on "fungicides and insecticides" and those on "fungicides", "inorganic insecticides" and "soil treatment". The rest are virtually unchanged. On the other hand, the numbers of entries in both the author and the subject indexes have increased substantially.

It is, of course, true that full treatment of this field today requires much more space than Dr. Martin has been allowed. Thus the German equivalent, Volume VI of the "Handbuch der Pflanzenkrankheiten", is planned in four parts, of which the first alone runs to 450 pages. It is inevitable, therefore, that Dr. Martin has had to be very selective, and by no means everyone will agree with him about what

s gone in and what has been left out. The present
iewer has quickly run up a list of over a score
topics or aspects of topics which he thinks
uld have gone in. These include the pheno-
non of "resistance" elicited as a response to
ecticides and acaricides, which is threatening the
ole concept of chemical control of certain pests;
fundamental work on the use of very low
umes for applying fungicides and, more recently,
ecticides; the role of plant phenolics in resistance
diseases such as barley mildew and apple or pear
b; and the work on leaf waxes as fungitoxicants
well as solubilizers of copper from bordeaux
osits. It is also disappointing to see no reference
important fungitoxicants such as the nitroso-
razoles, the omadines, the *s*-triazines, the groups
her than captan) that utilize the trichloro-
thylthio-group, and the organotin fungicides;
r to some of the more important organophos-
orus insecticides such as Rogor (or its U.S.
uivalent, dimethoate). Much work has been done
various groups on the mode of action of oxine
d its derivatives, of dichlone and other fungicides
relation to fungal enzyme systems, and of
ychloronitrobenzenes and griseofulvin. The
l-culture technique for studying fungicidal action
not mentioned, nor are the six papers published
m Rothamsted in the period 1947–57 on
ticle size and interrelated physical factors
olved in insecticidal action. Sulphur-shyness is
rred to with the remark that Sessions' "simple
tionship between acidity of cell-sap and
sitivity . . . has not been widely confirmed";
importance of pH and especially of buffering
acity has, however, been shown for both apple
gooseberry by Turrell and Bentley (1957).
is a pity, too, that the incorrect statement on
48 of the 3rd edition should be perpetuated at
foot of p. 39 of the new edition. That wood
ections are of negligible importance compared
th perithecia as a source of apple scab infections
English orchards, as in sprayed orchards any-
here else, was clearly recognized by Salmon and
are as long ago as 1924 and has recently been
nfirmed by work with an effective spore trap by
rst *et al.* (1955).

hese omissions merely emphasize the impossibility
giving full cover of the field in a book of this
e. There is, of course, much to be said for one
thor attempting to synthesize the knowledge
ined by workers in many and diverse disciplines
vering this field, and Hubert Martin is certainly in
unique position to do this. The book remains the
ost comprehensive and scholarly textbook in the
nglish language, or for that matter, until the other
ree parts of the German book appear, in any
nguage so far as the reviewer knows. Technically,
e book is very satisfactory, though misprints,
cluding errors in the indexing, are not absent.

A.H.M.K.

3078. MENON, K. P. V., AND PANDALAI, K. M.
*The coconut palm: a monograph.*
Indian Central Coconut Committee, Ernakulam, 1958, 12×9 in., pp. xvi+384, bibls, illus., Rs. 38 or 85s. or $11.95.

It is now many years since an authoritative book on the coconut was produced, and for some considerable time there has been a great need for such a work. This need has now been met, and we have here one of the most comprehensive of crop monographs. The authors have collected in this one large volume an immense quantity of information about coconut growing: the author index alone runs to about 500 names, and many of these are authors of several works. The patient labour involved in finding and sifting this mass of literature was undoubtedly very great. But, in spite of—or perhaps because of—its most comprehensive nature, the great mass of information is largely undigested and reproduced rather uncritically. Although all the quoted work is of historical interest, inevitably much of it is out-of-date and has been superseded by later investigations. The book would have been improved, therefore, by discarding some of the less valuable matter—or by relegating it to the bibliography—and by the addition of critical, well-digested reviews of the major topics. Nevertheless, one cannot have it both ways, and for those who want all the available information, both old and new, on any aspect of coconut growing, with little fear of any important work being missed, this book will provide it.

The 18 chapters run the usual gamut, from morphology and biology, through varieties, soils, management, pests and diseases, etc., to products. With one major lacuna it is all here. This serious omission is copra making, a task usually carried out by the grower and on which depends the outcome of the whole business of growing coconuts. There has been endless research on kiln design and copra making techniques, but it is all dismissed in 3 pages, whereas matters of far less importance, such as tapping and abnormalities of the palm, are treated *in extenso*.

The production of this large book is commendable, with good paper and printing. However, although some of the pictures are excellent, others are quite the reverse; for instance on p. 249 we are shown a palm severely damaged by *Oryctes* but captioned "a healthy palm", and Fig. 45, described on p. 119 as an example of "some of the best and largest gardens", depicts a miserable collection plainly suffering from very bad drainage. On p. 3 a "panoramic view of coconut gardens" consists mostly of the roofs of houses. Nevertheless, in spite of these strictures, this book can be unreservedly recommended to all concerned with growing coconuts and particularly to those engaged in coconut research. It is invaluable; it has no rival and is unlikely to have a rival in its field for many years. In view of its size and most comprehensive character the price is fair. G.E.T.

3079. Randhawa, M. S.
***Agricultural research in India. Institutes and organisations.***
Indian Council of Agricultural Research, New Delhi, 1958, 11×9 in., pp. 448, illus., Rs. 20.

In this work are listed and described the leading federal research establishments, and merely listed with a note or two the very numerous similar establishments of the different States. In the first category and of particular interest to the horticulturist are the following: 1. The Indian Council of Agricultural Research, New Delhi. 2. The Central Research Institutes. Among them is the Indian Agricultural Research Institute at New Delhi. This includes 6 old established Divisions, viz. for Agronomy, Botany, Entomology, Mycology, Soil Science and Agricultural Chemistry, and Agricultural Engineering, as well as the recently established Division of Horticulture. This main Institute has sub-stations at Pusa, Karnal, Simla, Indore, Wellington, Poona, Kalimpong, Bhowali and Katrain. Another relevant Central Institute is the Composite Regional Station for Cotton, Oil seeds and Millet. Next come the Central Commodity Committees. Those which chiefly concern us are the Indian Central Coconut Committee with headquarters at Ernakulam, the several Central Coconut Research Stations, the Indian Central Arecanut Committee with headquarters at Kozhikode, the Indian Central Oilseeds Committee at Hyderabad, the Indian Central Tobacco Committee at Madras, the Indian Central Sugarcane Committee with headquarters at New Delhi, the Sugarcane Breeding Institute at Coimbatore, the Indian Institute of Sugarcane Research at Lucknow and the National Sugar Institute at Kanpur. Accounts of these are followed by brief notes on activities under state, not federal, management. Their name is legion, but perusal of the details afforded shows about 90 to be concerned with horticultural crops of different kinds. The work concludes with a list of the names of the personnel in the various central research institutes. It is a different and much fuller publication than the Directory of the Agricultural and Animal Husbandry Research Stations in India issued in 1955 [see *H.A.*, 28: 3186]. It should prove very useful.

3080. Rowley, G.
***Flowering succulents.***
Living Colour Publications, Barclays Bank Chambers, Farnham, Surrey, 1959, 7×4½ in., pp. 80, bibls, illus., 7s. 6d.

Mr. Rowley starts one of his chapters by asking bluntly: "Are succulent collectors mad?" He answers this question by admitting that, at least in the more advanced cases, the collector is apt to become "mad with enthusiasm for a hobby that gets more consumingly interesting the more deeply one gets drawn into it". Now, Gordon Rowley himself is nothing if not an enthusiast. He would probably even admit to being a fanatic. Does this conjure up in your mind a picture of an intensely earnest horticultural specialist writing rapturously about his subject with frequent quotations from (deservedly) minor poets? If so you would be entirely wrong.

This little book is written in a most lively manner. The author tempers his enthusiasm by persistently refusing to take succulent enthusiasts, himself included, too seriously. The result is a book that can be read purely for pleasure by any ordinary horticulturist and, I dare say, even by a confirmed cactophobe. Not that it should be regarded solely as a light-hearted general essay. It is packed with useful and eminently practical information covering almost everything, except the identification of individual species, that anyone is likely to want to know about cacti and other succulents. Types of succulent, their propagation, and methods of cultivation, whether on a window-sill in an urban flat or in a specially designed glasshouse, are among the many aspects described with common sense and clarity. The beginner could not wish for a better guide, and even the old hand might learn a thing or two to his advantage.

Finally, a word about the publishers. This is the first production of a new publishing house. An explanatory letter suggests—more or less—that it consists of two men and a boy. If this is really so, then all that need be said is that even the boy knows his stuff. The text appears to be laudably free from errors. The coloured plates are most handsome, and the many photographs and line drawings show exactly what they are meant to depict. Let us hope that this will be the first of many attractive little books to be offered at modest prices.

G.K.A.

3081. Schilling, G.
*Magnesium—ein universeller Pflanzennährstoff.* **(Magnesium—a universal plant food.)**
Bergbau-Handel, Berlin, 1957, 8×6 in., pp. 107, bibl. 75, illus.

This small, but well produced review is provided with translations into English, French, Russian and Spanish of the legends of illustrations, tables and graphs, as well as of the preface and the summaries of most of its sections. The uptake of Mg, Ca and major elements per ha. is tabulated for various crops, including tobacco, peas, vines, cucumbers, carrots, onions, lettuce, spinach, celery, beans, kohl-rabi, cabbage and radish. [A previous book on this subject was published by the same institution in 1952—see *H.A.*, 23: 1371.]

2. SHEWELL-COOPER, W. E.
*The A.B.C. of soils, including manuring, composts and lawns.*
The English Universities Press, London, 1959, 7×5 in., pp. 145, illus., 8s. 6d.

might be expected from a council member of the
s Association, principles of organic gardening
emphasized throughout this book. The author
lains in simple terms the complexities of the soil
offers advice on the use of organic fertilizers,
the preparation of several types of compost and
green manuring. Lawn preparation and main-
nce are adequately covered in the second half
he book, with some interesting information on
ommon types of lawn composed of chamomile,
er or alpine plants.

3. SHOEMAKER, J. S., AND TESKEY, B. J. E.
*Tree fruit production.*
John Wiley & Sons, New York, and Chapman & Hall, London, 1959, 8½×5½ in., pp. 456, bibls, illus., 56s. or $7.00.

essentials of a student textbook on any aspect
orticulture are that it should provide descrip-
s of all the operations involved in the culture
the crops, together with an outline of the
erlying principles and research on which these
rations are based, and with references to the
ant publications. Such textbooks on fruit
ing are sadly lacking in this country and
nts must rely on books and bulletins written
arily for growers, supplemented by research
on reports and other scientific publications.
that reason any textbook produced in English
s attention, and the fact that this new book by
emaker and Teskey is based on experience
ed over a widespread region of the U.S.A. and
ada, encourages the hope that much of the text
ld prove useful in the United Kingdom and
er fruit growing areas.

layout is very simple, and separate chapters are
vided for apples, pears, peaches, cherries, plums
citrus fruits. A special chapter is devoted to
alled "dwarf" apples and pears, though these
, by European standards, mainly normal bush
s on rootstocks of moderate vigour. Nectarines
quinces are briefly covered in a chapter devoted
gely to apricots. The fullest treatment is given
apples and peaches, which is not surprising as,
rt from citrus, they are the most widely culti-
ed of the fruits. Within each chapter all the
al cultural aspects are discussed—distribution,
pagation, varieties (incidentally it is interesting
note how many varieties still grown date from
r 100 years ago), choice of site, planting, etc.,
nt through to picking, storage and marketing.
chief insect pests and diseases are briefly
cribed, but control measures are only touched
in very general terms. Virus diseases are rather
dequately covered.
The instructions given are usually accurate, up to date, and clearly expressed, and in most cases the scientific background has been well presented. The authors claim to have drawn on research abroad as well as in the U.S.A., but out of more than 800 references listed for further reading only 15 were published outside North America. This might indicate that little research of value to America has been done in other countries, but it seems more probable that the publications of these countries are so poorly available to American Universities and Colleges that it would be pointless to call the attention of students to them. How else can one explain, for instance, the omission of any reference to Hatton and Amos when discussing the Malling rootstocks, or to Wallace when discussing nutrition, except for reference to the Ministry of Agriculture's bulletin No. 107. This restricted citation of the available literature may to some extent reduce the value of the book to students outside North America.

Illustrations are plentiful but many of them have suffered by too great reduction so that they do not tell the reader much. Some may consider that a skilled worker would not kneel to bud rootstocks as shown in Figure 2 or that if he did he could not achieve a worthwhile output, and that the drawing of tree development in Figure 16 was done by an artist more familiar with forest trees than fruit trees.

In spite of certain imperfections noted above this is an outstanding book and goes far to fulfilling the needs of students in all parts of the world where deciduous tree fruits are grown. No horticultural department can afford to be without it, but the price is likely to limit the number of students outside the dollar area who can possess a personal copy. H.B.S.M.

3084. TERRIEN, J., TRUFFAUT, G., AND CARLES, J.
*Light, vegetation and chlorophyll.*
Hutchinson, London, 1957, 7½×5 in., pp. 228, bibl. 13, illus., 15s.

The idea of combining translations of the deservedly popular *Lumière et Vegetation* of the first two authors and *L'Energie Chlorophyllienne* of the third in one volume is to be commended. The first work, comprising almost two-thirds of the present volume, deals with the nature of light, its distribution in sunlight in the different climatic zones and its action on vegetation. The non-physicist may be astonished by the amount of radiant energy from the sun received by the earth, of which nearly half is within the visible spectrum. Bearing in mind the vital importance of a long term improvement in world crop production, the fractional utilization of the light energy available by plants is pointed out, and the spectacular increases obtained by the use of intermittent artificial light of suitable spectral composition are stressed. Photosynthesis is described with great clarity but without any attempt to minimize the extreme complexity of the physico-chemical processes involved. By means of an ingenious analogy with the Gurney and Mott theory of the formation of latent images in photographic emulsion, a tentative explanation of the physical side of the process is made, which goes some way towards resolving the difficulty of reconciling the deduced quanta distributions with the factual observations. Phototropism and photoperiodism are also touched on briefly.

In the second part the chlorophylls are described, and a detailed exposition is given of modern ideas on the chemistry of photosynthesis, as elucidated with labelled carbon and phosphorus and paper chromatographic techniques. An interesting comparison is made between the energy obtained from water when used to produce hydro-electric power and when used for the formation of calories in foodstuffs through irrigation. The book is commendably free from misprints, but some readers may be disturbed at finding the term "glucosides" used to denote "sugars". H.L.

3085. Tritton, S. M.
*Successful wine and liqueur making.*
Grey Owl Labs, Almondsbury, Glos., revised 1959, pp. 51, 5s.

This booklet is a complete treatise for the optimistic amateur, giving the why and wherefore, the how and the what, and encouraging the use of numerous horticultural products. The previous edition [see *H.A.*, 25: 1412] has been revised and enlarged with additional information on mead, vermouth and liqueurs.

### *Annuals and reports.*

3086. Alm. Dansk Gartnerforening. (Danvig, A. M., and Pedersen, K.)
*Årbog for Gartneri, fyrretyvende årgang 1958.*
**(40th Danish Horticultural Yearbook 1958.)**
S. L. Møllers Bogtrykkeri, Copenhagen, 1959, pp. 208, illus., Kr. 5.

Details of small-scale manurial trials with various crops are again preceded by a comprehensive directory and extensive statistics of Danish horticulture. A list of the experimental results obtained during the period 1948–1958 and published in previous yearbooks is given on pp. 111–15. The ornamental section contains a description of dahlia varieties. The 39th Annual Report of the Committee for Vegetable Variety Trials (pp. 126–82, including an English summary of 2 pp.) deals chiefly with the selection of strains of the following crops: January-sown cauliflowers, early outdoor lettuces, outdoor summer lettuces, and cauliflowers maturing in August. An illustrated treatise is also provided on blotchy ripening in tomatoes and its prevention (pp. 191–208).

3087. British Guiana.
*Annual Report of the Director of Agriculture for the year 1957,* pp. 52, cyclostyled

Includes progress reports on: Sugar cane: variet testing, leaf scald studies. Citrus: fertilizer trial Coconuts: fertilizer experiments and pest control

3088. Bundesversuchsanstalt für alpenländische Landwirtschaft Gumpenstein.
*Bericht über die Arbeitstagung 1957 de "Arbeitsgemeinschaft der Saatzuchtleiter" im Rahmen der "Vereinigung österreichische Saatgutzüchter".* **(Report of the 1957 meetin of the working group of heads of seed production within the Association of Austrian See Producers)**, 1957, pp. 199, bibls, illus.

Including a paper by O. Banga (pp. 142–60) o forecasting the performance of new horticultura varieties, with special reference to work at th Wageningen phytotron.

3089. Canada.
*Report of the Minister of Agriculture fo Canada for year ended March 31st, 195*
pp. 144.

Science Service. *Tobacco* (p. 33). Marked inhibition of respiration, germination and growth o seedlings followed the permitted decomposition o plant residues of timothy, maize, rye or tobacco i the soil, especially when decomposition took plac for 15 to 25 days under conditions of high soi moisture and acidity. *Vegetables* (pp. 33–4) Nematodes in celery soil were reduced by applications of Dowfume, Telone and D-D. Thre cucumber viruses were under investigation. Thioneb, captan and Mylone reduced the incidence o root rot of peas by more than half. Variou chemicals were successfully tested against roo maggots of onions, rutabagas [swedes], cabbage and radishes. *Tree fruits, plant protection* (pp 35–41). Cyprex and Dyrene gave good control o apple scab. Since the replacement of sulphur b the organic fungicides for scab control it ha become necessary to add 3 lb. sulphur to eac 100 gal. organic fungicide spray to control appl mildew also. The host range of the stem pit viru of apple in the Okanagan Valley was shown t include Virginia Crab, Robin Crab and Robusta Iron and zinc chelates were tested for the correctio of mineral deficiencies. A trial in the Niagar Peninsula showed the value of planting virus-fre Montmorency stocks in isolation from othe possibly infected cherry stocks. A number o acaricides proved effective, and the conclusion i reached that no one compound is best under a conditions. The same applies in the treatment o codling moth, ryania being successful in Nov Scotia but not in Ontario or B.C. An experiment insecticide, Sevin, gave excellent control of codlin in both the latter provinces and promising resul against the eye-spotted bud moth, aphids, fru

leaf roller, pear psylla, lecanium scale, oriental
moth, plum curculio and red banded leaf
r in various places. Tests on concentrate
ying were continued. In orchard trials certain
icides [not named] were found to increase
itrogen in the foliage with subsequent lowering
uit storage quality. Work is also reported on
berry viruses and their vectors and on straw-
y viruses and the possibility of breeding for
tance to *Verticillium* wilt. *Ornamentals* (p. 41).
trol of various pests and diseases.
ERIMENTAL FARMS SERVICE. *Winter hardiness*
2). A method of testing seedlings for winter
iness is being sought. Some progress has
made in the application of electrical con-
ivity tests for the purpose. *Tobacco* (pp.
). A foliar spray of gibberellic acid at 0·5
2·0 mg. per plant significantly decreased
nicotine content of both uncured and cured
cco. Partial pruning improved the quality
igar tobacco. Weather flecking is being
tigated. MH used to control suckers led to a
er total sugar:nicotine ratio than hand
ckering. Nutritional problems under study
ded the Ca:K interactions in tobacco soils,
ffect of manuring the preceding rye crop, band
ization in preference to broadcasting, the use
pplemental K for cigarette burley tobacco and
rovision of balanced nutrition for flue-cured
cco. Of 4 curing systems the propane gas
m was preferable for flue-cured tobacco owing
rapidity and efficiency. *Strawberries* (pp. 93
1). A scheme has been established at Ottawa,
ville and Agassiz to maintain new selections in
us-free state by indexing and to build up small
lations of virus-free standard varieties. New
berry varieties from Ottawa, namely Cavalier,
adier, Guardsman and Redcoat, show promise
everal provinces. *Bulk handling of apples*
4). In co-operation with industry Summerland
conducted studies to evaluate the harvesting
storage of apples in 25-bushel bulk containers
ad of the 1-bushel containers normally used.
*table mulching* (p. 92). Mulching with clear
black polythene is under trial where the grow-
eason is only short.

. COLOMBIA. MINISTERIO DE AGRICULTURA.
*III Reunión interamericana de fitogenetistas, fitopatólogos, entomólogos y edafólogos, Bogotá D.E.—Colombia, 20 de junio a 1° de julio de 1955.* (**Third inter-American congress of plant geneticists, plant pathologists, entomologists and soil scientists, Bogota, Colombia, 20th June-1st July, 1955**), 1958, pp. 459, bibls.
genetics section of this report includes 4 brief
naries of work on breeding and selection of
s (*Phaseolus*) in Colombia, and a very brief
minary report on factors affecting yields in
mbian coffee. The plant pathology section
includes brief notes on bean diseases, also notes on *Nectria* canker of coffee, and diseases of cacao. Some of these articles, as well as those from the entomology and soils sections, have been abstracted separately.

3091. COLONIAL PESTICIDES RESEARCH COMMITTEE. ***Eleventh Annual Report (1957-1958),*** 1958, pp. 207-27.

Research under review includes work on bunchy top disease of abacá, the coconut pest *Pseudotheraptus*, halo blight of beans, studies of insecticide persistence on crops and in soil and herbicide studies including work on aquatic weeds. Other pesticides research, briefly reported though not undertaken under the aegis of the Committee, includes work on the pests and diseases of cacao, citrus, coconuts, coffee and vegetables, and herbicide investigations with bananas, sisal and tea. The report includes a list of scientific papers published during the year.

3092. COLONIAL PRODUCTS COUNCIL. ***Fifth Annual Report (1957-1958),*** 1958, pp. 228-52.

After a review of the many enquiries dealt with at the Tropical Products Institute (formerly the Colonial Products Laboratory), some of the investigations in progress at the Institute are reported. These include work on East African sandalwood roots, geranium oil, shea nut butter, palm oil, pyrethrum and derris. Investigations in progress elsewhere, but which are undertaken under the aegis of the Council, include work on plant pathogens, anti-fungal antibiotics, cacao curing, plant polyphenols and a number of minor plant products.

3093. COMMITTEE FOR COLONIAL AGRICULTURAL, ANIMAL HEALTH AND FORESTRY RESEARCH. ***Thirteenth Annual Report 1957-1958,*** 1958, pp. 17-132.

This report provides a condensed account of the progress of the vast and diverse range of research activities being undertaken in the British Colonies. Under the heading of Regional Research are described the activities of inter-territorial and similar organizations, which are carrying out research on major problems and of a fundamental nature, including work on bananas, cacao, oil palms, sugar cane and regional floras. Other research projects, undertaken with assistance from Colonial Development and Welfare funds, include work on abacá, coconuts and pepper. The report then covers the research activities of the territorial departments and describes the more important recent developments. In this section are included the following crops of horticultural interest: bananas, cacao, cashew, castor, citrus, cloves, coconuts, coffee, derris, pineapples, sugar cane, tea, tobacco, tung and vegetables. The report includes useful lists of scientific papers published by colonial workers during the year.

3094. East Malling.
*Annual Report of East Malling Research Station for 1958,* 1959, **A42,** pp. xxvi+178, bibls, illus., 17s. 6d. or $2.50 post free.

As in the past this report covers research activities in 4 parts, the first of which deals with the experimental farm (pp. 1–6).

*Part II. General review of research work* (pp. 7–40): This part contains much interesting information on work in progress, and is the subject of an admirably lucid summary by H. B. S. Montgomery in Part IV under the title "Research in fruit crops in 1958" (pp. 168–73). Among the many items recorded are: *Rootstocks:* The problem of poor bud break of certain apple varieties on M.26; *Pyrus calleryana* as a rootstock for pears; and attempts to raise pear × quince hybrids as rootstocks. *Propagation:* Further studies on softwood and hardwood cuttings of apple and plum rootstocks. *Pruning vs. no pruning:* For young pear and plum trees. *Fruiting:* Fruit set and irregular cropping in Cox's Orange Pippin. *Currants and gooseberries:* The development of hybrids in the quest for larger black currants and spineless gooseberries. *Weed-killers:* The successful use of 2,4-DES and dinoseb in strawberries and of MCPB in black currants. *Growth studies:* The effects of pruning and deblossoming and also of shading on apples; and methods of producing wide-angled crotches in plums. *Carbohydrate resources:* Seasonal changes in apple trees. *Magnesium sprays:* Magnesium chloride and nitrate appear to be absorbed more readily than magnesium sulphate. *Mineral composition of apples:* Trees growing in moist soil were found to contain 30% less N, 50% more P and 15% more K per unit D.M. than plants growing in drier soil; no explanation has yet been advanced for this phenomenon. *Fungus diseases:* Biochemical studies are in progress on scab-resistant *Malus* spp.; two chemicals, cinnamic and *o*-coumaric acids, which are related to compounds found in apples that inhibit scab development, have given good control of the disease in greenhouse and field tests; cinnamic acid has also given some control against *Gloeosporium* storage rots, though captan was more effective. *Virus diseases:* A virus has been proved responsible for star-crack disease of apples; heat treatment has been successfully applied to pears to rid them of vein yellows virus; the soil-borne raspberry yellow dwarf virus has proved the cause of strawberry mosaic disease in certain localities. *Pests:* Work is reported on the development of resistance to sprays by mites, and on the control of aphids, the strawberry seed beetle and nematodes; one interesting discovery was that deposits from insecticides applied to apple trees on the same day may later show differences as much as four-fold, depending on differences in the stage of development of the buds. *Fruit storage:* It is now possible to forecast accurately how apple fruits from manurial treatments will keep as regards both *Gloeosporium* rots and breakdown.

*Part III. Research reports and reviews* (pp. 41-142). Most of these research papers, which cover hops as well as fruit, are abstracted separately. In addition reference may be made to the following: The eleventh Amos Memorial Lecture—"Meteorological factors in the growth of plants", by Sir David Brunt; "Spray experiments on the control of bacterial canker of cherry", by M. H. Moore, J. E. Crosse and M. Bennett, which reviews work carried out at East Malling over many years; and "A mild strain of hop mosaic virus", by J. T. Legg, which presents evidence that two types of hop mosaic virus, lethal and mild, are caused by strains of one virus.

*Part IV. Bulletins for fruit growers* (pp. 143-73). In all 9 bulletins are published, including the review of research by H. B. S. Montgomery referred to above. R. V. Harris contributes a similar review of "Progress in research on *Verticillium* wilt and virus diseases of hops in 1958". In addition, the following subjects are reviewed: "Irregular cropping of pears", by W. S. Rogers and G. A. Booth; "Thirty-five years' results with some Malling clonal apple rootstocks", by A. P. Preston [for a more detailed account see *H.A.*, 29: 1094]; "Fire-blight disease of pear", by J. E. Crosse, M. Bennett and C. M. E. Garrett; "Resistance trials of some apple rootstock varieties to collar rot (*Phytophthora cactorum*)", by G. W. F. Sewell and J. F. Wilson [see *H.A.*, 29: 1267]; "Research on hop virus diseases at East Malling", by J. T. Legg and P. J. Ormerod [see separate abstract]; and "Russeting and cracking of Cox's Orange Pippin apples", by H. B. S. Montgomery, in which some of the causes are discussed and suggestions made for reducing losses from these blemishes.

The report is provided with a useful subject index.

3095. Fisons Limited.
*Levington Research Station 1959,* pp. 44 illus.

Research reported includes the N, Fe and Mg nutrition of tomatoes, manuring of strawberries, inhibiting bolting of lettuce and beetroot by maleic hydrazide sprays, urea formaldehyde applications for lawns, and control of lawn weeds.

3096. Friesdorf. (Möhring, H. K.)
*XXIX. Tätigkeitsbericht 1957 der Gärtnerischen Versuchsanstalt zu Friesdorf/Bad Godesberg.* **(29th Annual Report of the Horticultural Experiment Station at Friesdorf/Bad Godesberg for 1957),** pp. 50, illus.

Trials were carried out with new varieties of chrysanthemum, gladiolus, tulip and hydrangea. Other work concerned weed control by flame thrower and Vapam, the "Sterilo" apparatus which is recommended for soil sterilization, peat as a cultural medium, and the fertilizer Corfuna, which sists of a mixture of ground vine seeds with ed stable manure. Three sections are abstracted rately.

7. GLASSHOUSE CROPS RESEARCH INSTITUTE.
***Annual Report of the Glasshouse Crops Research Institute, Littlehampton, for 1957,*** 1959, pp. 161, bibls, illus., 10s.

report includes papers on the following jects: *Plant Physiology:* Comparison of yields n single and multi-stemmed tomato plants, cing of glasshouse tomatoes. *Chemistry:* Studies the composition of tomato fruit, soil analyses, ilizing with urea-formaldehyde compounds, the cts of nutrient concentration, the K/N ratio and deficiency, and studies on mushroom compost casing. *Plant Pathology: Didymella* stem rot, umber mildew, carnation wilts and mushroom ases. *Entomology:* greenhouse white fly, mush- m insects and greenhouse red spider mite. *p protection:* Control of chrysanthemum mil- , control of lettuce aphids with fluoracetamide the determination of Diazinon residues on umbers. Many of the papers are abstracted rately. M.C.S.

8. GRENADA.
***Reports on the Agricultural Department for the years 1954, 1955 and 1956,*** 1957 and 1958, pp. 26, 32 and 37, each $1.00 [received 1959].

orts on the cacao industry improvement scheme ude work on fertilizer and cultural trials and on pagation. There are also scattered references to effects of the serious hurricane "Janet", which ck the island in September, 1955.

9. HAWAII.
***Biennial Report of the Hawaii Agricultural Experiment Station, 1956-58,*** Honolulu, 1958, pp. 74, illus.

f reports on research concern the following ticultural subjects: *Agricultural Biochemistry:* ssion fruit by-products; the arsenic content of fee after weed control applications. *Agricultural onomics:* Marketing frozen passion fruit and va juices, and floral products and macadamia s. *Agricultural Engineering:* Macadamia nut ker; pre-shipment processing of papaws; coffee n drying. *Entomology:* Passion fruit and cadamia pollination studies; fruit fly control; ects of various insecticidal formulations on ects and plants; use of micro-organisms for ect control; biology and control of mites and pentine leaf miners. *Horticulture:* Selection and eding of Barbados cherry, papaw, macadamia, thurium and orchids; soil fumigation studies h papaws. *Plant Pathology:* Control of diseases banana, mango, papaw, passion fruit, orchids, nation, celery and tomato; soil fumigation dies for nematode control. *Plant Physiology:* gar cane crop-logging; studies on macadamia, litchi, coffee, papaw and passion fruit. *Vegetable crops:* Weed control; cucurbit, legume and lettuce breeding; onion selection; disease resistance and high ascorbic acid content in tomato.

3100. I.N.É.A.C.
Rapport annuel pour l'exercice 1957. (**Annual report on the work of I.N.E.A.C. for 1957.**) *Publ. hors. Sér. Inst. nat. Ét. agron. Congo belge*, Brussels, 1959, pp. 529, 160 fr. belg.

This most comprehensive report describes the current investigations in progress at numerous research stations in the Belgian Congo. Much of the work described is undertaken by the twenty or so divisions of the Research Centre at Yangambi, and the remainder is dealt with under 9 regional groups. All branches of agricultural science are included. The chief crops are oil palms, rubber, coffee, cacao and bananas, and very numerous projects on breeding, management and plant protection are described. Crops of rather less importance, but on which numerous experiments are also in progress, are various tropical fruits, spices, oil seeds, medicinal crops, essential oils, fibres, pyrethrum, tobacco, vegetables, tea and sugar cane.

3101. JERSEY.
***Annual Report of the States Experimental Farm, Trinity, Jersey for 1957,*** 1958, pp. 56.

Results from the following experiments are included: Treatment with BOV and PCP gave satisfactory weed control during early growth of anemones. Composting of *Didymella*-infected tomato haulms reduced disease transmission; fortnightly sprays of zineb, Lirozate, phelam, maneb and copper oxychloride all gave similar degrees of *Didymella* control. DD continued to give satisfactory nematode control, and tomato yields were similar to those obtained following treatment with sodium methyldithiocarbamate [Vapam].

3102. MASSACHUSETTS.
***Annual Report of Massachusetts Agricultural Experiment Station for 1956-1957,*** being *Bull.* **503**, pp. 63.

Nearly the whole of this report consists of brief notes of progress on innumerable projects, arranged under departmental headings. Those concerned with pomology, cranberries, entomology, vegetables and floriculture are abstracted separately [see abstracts 2095, 2196, 2418, 2430 and 2712]. Among other items are the following from the Department of Botany, reported by T. T. Kozlowski on pp. 16–20: The control of peach canker (*Fusicococcum amygdali*) is now being evolved with the aid of dichlone ¼ lb., ferbam 1 lb., captan 2 lb. and thiram 2 lb. to 100 gal. water plus glyodin 1 pint for wetting and sticking. *Carnation diseases.* Transmission and susceptibility to several viruses are being studied. Attempts are being made to control wilt (*Fusarium oxysporum* f. *dianthi*) by soil drenches with numerous chemicals. *Propagation of nursery stock.* Effects of antibiotics and the new organic fungicides are being tested on the survival, rooting and subsequent growth of cuttings of nursery stock. Results, which vary considerably with different species, are discussed.

3103. MAURITIUS.
*Annual Report of the Mauritius Department of Agriculture for 1956,* 1958, pp. 80, R. 1.25.

The investigational work reported includes the following: *Vegetables:* fertilizer trials. *Tobacco:* seed bed techniques, including pest control; curing studies. *Sugar cane:* disease and pest control. *Citrus:* mineral deficiencies.

3104. MINISTRY OF AGRICULTURE, NORTHERN IRELAND.
*The Research and Experimental Record of the Ministry of Agriculture, Northern Ireland, 1957,* 1958, Vol. 7, pp. 286, 12s. 6d.

*Part I.* Articles describing recent research carried out under the direction of the Ministry; with the exception of one [see abstract 2378] these are on agricultural subjects. *Part II.* Annual reports from the research divisions of the Ministry. A single application of Amiton gave promising control of fruit tree red spider. Sprays of DDT or lead arsenate kept attack by codling moth to a minimum. Blackcurrant gall mite was successfully controlled by 0·025% endrin applied at the grape stage, but the application of 0·075% endrin at the fruitlet stage affected fruit flavour; big bud incidence was reduced most effectively by endrin at 0·037% or 0·075% applied at fruit set. Manzate was as effective as mercuric chloride against *Plasmodiophora brassicae*, but at relatively high rates Manzate had some adverse effects on growth. Nutritional studies showed that deficient N was associated with a higher value for the clubroot disease index, but that neither P nor K was associated with any marked effect on the index. In other experiments nutrition influenced the disease index under different levels of spore load, N more than P and K. Rose rust was most effectively controlled by Fermate+Spersul, Fermate, and oil–bordeaux in April and May followed by Fernide from June onwards, and leaf retention on these plots was satisfactory. *Part III.* A report on agricultural experiments and demonstrations includes the following work at the Horticultural Centre, Loughall, Co. Armagh: Scab control trials with phenyl mercury compounds and dimethyldithiocarbamate; the effect of captan on the incidence of storage rots; orchard sward comparisons; brussels sprouts variety and manurial trials; weed control in raspberries, strawberries, parsnips, carrots and beet; strawberry trials on varieties, spacing, manuring, defoliation, systems of cultivation and weed control.

3105. NATIONAL RESEARCH COUNCIL OF CANADA
*Review of the National Research Counci 1958,* being *NRC* **4784,** pp. 337, illus. 75 cents.

The nearest approach reported here to work o indirect, but considerable, importance to th horticulturist is that concerned with plant physiology (p. 44). A few details are given of investigations on photosynthetic carbon dioxide assimilatio by leaves, the translocation and fate of organi compounds in plants, and chlorophyll chemistry.

3106. ONTARIO DEPARTMENT OF AGRICULTURE.
*82nd Annual Report of the Ontario Agricultural College and Experimental Farm 1957* Guelph, 1958, pp. 85.

Projects touched on include hormone thinning o apple trees, the use of gibberellin on tomatoes, celery, water and musk melons, and cuttings o ornamental nursery stock. Most of the report is made up of lists of projects, publications, successfu students and finance.

3107. QUEENSLAND.
*Annual Report of the Department o Agriculture and Stock for the year 1957-58* 1958, pp. 122, illus.

In the report from the horticultural branch, the following projects are included: *Pineapples:* fertilizer problems, "forcing" a summer crop to avoi blackheart, spacing of inter-row drains an "woodiness" in fruits. *Bananas:* fertilizer experiments, bits *vs* suckers for planting, kerosene fo desuckering, spacing effect on yield and sucke development, and water requirements. *Papaws* varietal selection, cool storage life, and ripening *Citrus:* variety trials, cincturing Washington Navels control of fruit rots by ammonia gas, cold storag of mandarins, and fumigation by ethylene dibromide. *Avocadoes:* marketing studies. *Apples:* fertilizer trials, sprays for chemical thinning an accelerating maturity, and gas storage. *Grapes Phylloxera*-resistant rootstock trials. *Passion fruit* propagation of disease resistant varieties, an processing. *Strawberries:* mulching materials, variety trials, and processing. *Mangoes:* physical an chemical changes during maturation and ripening *Figs:* processing. *Ginger:* time of harvesting *Tomatoes:* fertilizer trials, and breeding. *Othe vegetables:* breeding beans and peas, manuring an variety trials with cabbages, carrot spacing, and heat-tolerant lettuce variety. Tobacco fertilize trials are mentioned in the report of the agricultura branch.

3108. SOUTH AUSTRALIA.
*Report of the Minister of Agricultur S. Australia, for the year ended 30th Jun 1957,* 1958, pp. 81.

*Horticultural industries:* A continued decrease i the apple acreage is noticeable, though appl production, as the result of reduced biennia ing and improvement in management, e.g. use over covers, lighter pruning and supplementary r, has actually increased. Apricot and peach ages are increasing. Cherry acreage tends to . Citrus production, though falling in some icts, is expanding in the Murray Irrigation s. Continued new plantings of pears are being e in the irrigation areas. Vines on the whole ain stationary. Except for green peas and atoes vegetable production is still slow to and. *Major advances:* The apricot gummosis us *Eutypa* was found capable of growing and ing spores on vines. *Horticultural Research:* work of the 3 research centres at Berri, Black- d and Nuriootpa (vines) has been hampered by of staff. Nevertheless developments and mmendations contributing to progress cover: w summer squash, new sprays for apple scab codling moth, effective control of red scale of s, the recovery of prune trees infected with e leaf spot virus following 2 years under erranean clover, gas storage methods for pears, es and grapes. The desirability of an expansion egetable growing and of preparatory research nnexion therewith is stressed.

9. TANGANYIKA.
***Annual Report of the Department of Agriculture, 1957, Part II,*** Dar es Salaam, 1958, pp. 85, illus., 7s. 50 cts.

part of the Report deals with research activi- which have now been reorganized on the basis Regional Centres. It includes work on the owing: *Cashew:* yield recording, pest control. *er:* breeding and variety testing, pest control. *nuts:* fertilizer trials, tapering disease studies, control. *Coffee:* mulching, fertilizer and ing experiments, variety trial and selection k, studies on pests and diseases. *Pyrethrum:* with fertilizers and minor elements, cropping and picking experiments. *Sesame:* variety, ing and time of planting trials.

. UNITED STATES DEPARTMENT OF AGRICULTURE.
**Land,** being *Yearbook of Agriculture 1958.* Supt. Documents, Washington D.C., 1958, 9×5½ in., pp. 605, illus.

ry aspect of land use in the U.S.A., including nomics, ownership and planning for the future ere surveyed. Except in sections devoted to waii and Puerto Rico [see separate abstracts] iculture receives very little attention.

1. WAITE AGRICULTURAL RESEARCH INSTITUTE.
***Report of the Waite Agricultural Research Institute, South Australia, 1956-1957,*** [1958], pp. 60, illus.

ions on entomology and plant pathology ude reports of work on codling moth, grape lloxera, fusarium wilt of peas, fungal gummosis of apricots, and virus diseases of vines, cherries and tomatoes.

3112. WISCONSIN.
**What's new in farm science?** being *Part 2, 74th A.R. Wis. agric. Exp. Stat.* or *Bull.* **532,** 1958, pp. 103, illus.

*Tobacco:* Mylone afforded good control of grassy weeds. MH used for sucker control must be applied immediately after topping and must thoroughly cover the top leaves. Geigy 27901 showed promise as a straight chemical weed killer. Nitrate of potash proved of value for the improvement of tobacco burn. *Fruit crops:* Clean cultivation and complete fertilization are recommended for cherry crops. The control of both cherry leaf spot and brown rot can be achieved by a mixed spray of an antibiotic Actidione plus Fermate in water. Neither cherry flavour nor quality were affected by the use of the two soil insecticides aldrin and dieldrin. Genite-923, Mitox and Ovotran are recommended for pre-blossom applications to control European red mites on apple trees. Amino triazole shows promise, but is not yet officially recommended, for cranberry weed control. Sesone (or Crag herbicide) proved useful on irrigated strawberries. Substantially virus-free plants of 3 strawberry varieties can now be obtained. Monuron alone or with CIPC gives good weed control in the orchard. *Vegetables:* Peas were shown to need phosphorus applied either as a fertilizer or in sprays. Dichlone (Phygon) and captan (Orthocide) applied to pea seed afforded good protection against soil fungus diseases. Malathion or Guthion applied to lettuce controlled yellows by killing leaf hoppers. Muck soils were found to tie up so much insecticide that the systemic protection of crops on such soils does not seem practicable.

### *New periodicals.*

3113. INDIAN SOCIETY FOR PLANT PHYSIOLOGY, NEW DELHI.
*Indian Journal of Plant Physiology* [*Indian J. Plant Physiol.*], 1958, Vol. **1,** 10×6½ in., pp. 80, illus., Rs. 15/– (India) or Rs. 16/– (elsewhere) per annum.

This new journal will be published twice annually from 1959 and is open to contributions from members of the Society. The first number contains a record of the inauguration of the Society. The papers included in this number are wholly concerned with physiological studies on crop plants and two, of horticultural interest, are abstracted separately.

3114. TROPICAL PRODUCTS INSTITUTE.
***Tropical Science*** [*Trop. Sci.*], 1959, Vol. **1,** No. 1, 9½×6 in., pp. 70, illus., H.M.S.O., Lond., 6s. per number.

This quarterly journal replaces *Colonial Plant and Animal Products*, the journal of the Colonial

Products Laboratory, an institution which has been renamed the Tropical Products Institute since its removal to new premises in Gray's Inn Road, London. Although the current number contains no articles of immediate horticultural interest, this journal and the work of the Institute are normally largely concerned with tropical fruit and plantation crop products.

*Noted.*

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